The New Zealand

# Journal of Agriculture.

*Published by direction of the Hon. W. Lee Martin, Minister of Agriculture.*

Vol. 56. WELLINGTON, 20th JUNE, 1938. No. 6.

# Grass Staggers and Milk-fever.

## Preventive Measures during Flush Spring.

## Control of Grazing and Use of Dolomite.

D. MARSHALL, Veterinarian, Hamilton.

DURING the spring of 1937, covering the period July to September of that year, there was considerably more than the average amount of disease and mortality among dairy cows of the Waikato and surrounding districts. In our experience one large group of cases was of the milk-fever type. Deaths occurred (*a*) because of failure to recognize and treat cases as such; (*b*) from pneumonia (a common sequel to milk-fever), where the animal is down for some hours before being found, or is hastily and injudicially drenched; (*c*) because of the particularly stubborn nature of certain cases which resisted ordinary lines of treatment; and (*d*) because of the occasional presence, as a complication of conditions, of such troubles as acetonemia or metritis.

Another group included cases of the disease commonly termed "grass staggers." There appears to be considerable relationship between the groups, and it is evident that the increased mortality last year was due to some climatic peculiarity in the season.

It is the purpose of this article chiefly to discuss grass staggers and preventive measures, particularly to give an account of the use of dolomite for the latter after trials over the past three seasons, and also to give some notes on milk-fever and its control. The paper is based on work done at Hamilton during several seasons by Mr. T. A. Blake, M.R.C.V.S., and the writer in conjunction with officers at Wallaceville.

### *Grass Staggers.*

The above name is now generally used in the Waikato, but the disease is also called eclampsia and sepsis, and abroad the terms "lactation tetany" and "grass tetany" have been used. The condition may be defined as a disease of the lactating cow, characterized by greatly increased nervousness (hyperasthesia) or increased response to external stimuli, by the occurrence of convulsions, and by a reduction in magnesium content of blood.

#### Distribution.

The disease has been fully described by Sjollema in Holland. It seems to have been recognized there for at least twenty years, at first confined to a small area, but latterly more widely spread. It is seen particularly during the first few weeks after cows are turned out into the grass after having been in sheds during the winter.

It is becoming increasingly prevalent in England, one serious outbreak occurring about three years ago in Herefordshire. It is described by United States of America veterinary authorities as now frequently met in that country.

In New Zealand it occurs in varying degrees each spring in the Waikato and surrounding areas, to some extent in Whakatane and Manawatu districts, and in certain seasons in Hawke's Bay, Gisborne, and Wairarapa areas. There is little report of its occurrence in Taranaki, North Auckland, or the dairying districts near Auckland City. One case has recently been recorded by Mr. G. McDonald, M.R.C.V.S., from South Otago, occurring in a rich river-flat farm, well top-dressed.

In this *Journal* for October, 1928, Mr. C. V. Dayus, M.R.C.V.S., who was then stationed at Hamilton, described the condition as being prevalent that season, and it had been known for at least ten years previously. During the past nine years Mr. Blake and the writer have had experience of the disease each spring, and in collaboration with Dr. C. S. M. Hopkirk, Officer in Charge of the Wallaceville Veterinary Laboratory, and Dr. Cunningham, considerable work has been done in

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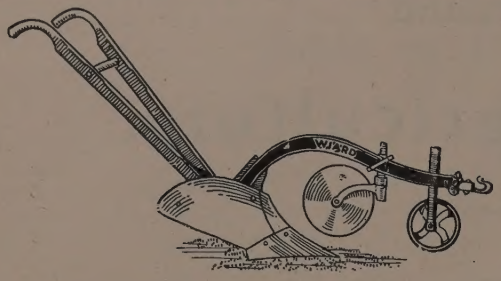


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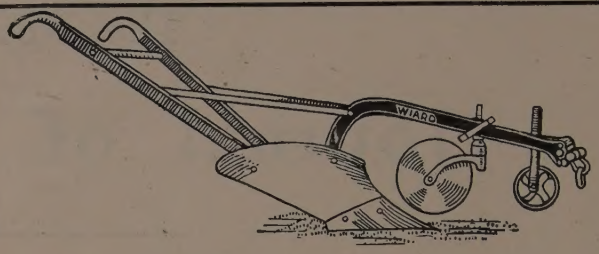


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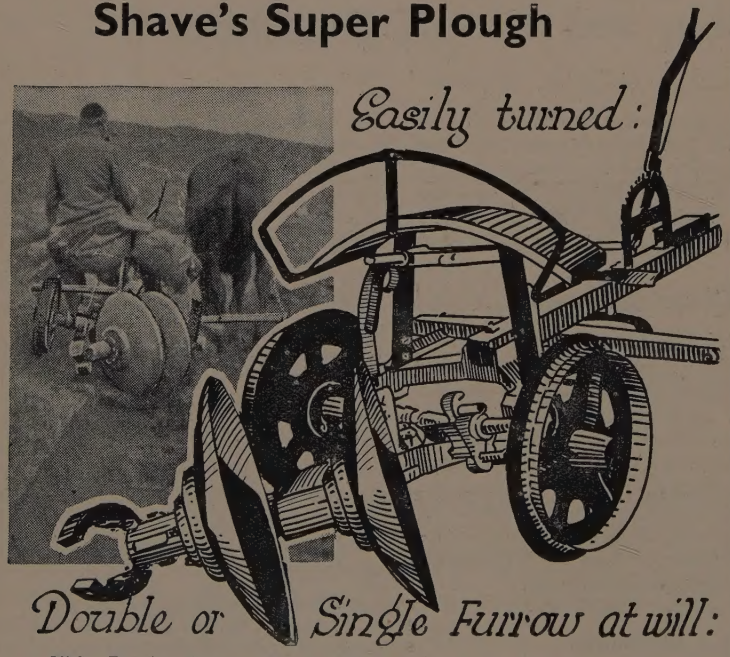


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the examination of specimens and in the development of preventive measures.

### Type of Cow Affected.

The disease appears almost entirely confined to cows actually giving milk, but one case was recently confirmed in a dry and empty cow seen by Mr. J. A. Melrose, Inspector of Stock. The affected animals are frequently good milkers and in good condition, but the disease has also been seen in cows producing very moderately and somewhat low in condition. It may occur in heifers after first calf. It is not confined to dairy herds, as cases have been seen and confirmed and deaths have occurred in herds of beef breeds where these are being grazed on improved pastures.

### Seasonal Occurrence.

As a rule, the first cases occur in the earlier districts and may be expected after the middle of July, but the complaint is most in evidence during August and September. Three cases occurred this season on one farm early in June, and in another early in July, but these are exceptional. In the later and more southern parts of the area cases may occur in October, but as a rule it is not met after the end of September.

### Length of Time Calved.

Many affected cows are about ten days calved, but just as many are four, six, or eight weeks, or occasionally several months calved. Time after calving appears to be of less importance as a predisposing cause than time of the year (stage of grass growth), but it is a valuable guide in diagnosis in helping to distinguish from milk-fever.

### Symptoms.

In the typical case, signs of undue nervousness are usually evident for one or two days or longer. The affected animal has an alert, easily startled air, and there may be a twitching of certain muscles. In stepping over a small depression, such as a shed-gutter, the feet are lifted unduly high. There may be a hackney gait. Going under a doorway she cringes unduly. She does not feed fully, although often she is seen with her head down making chewing movements, and the body becomes gaunt and somewhat tucked up. Persistent licking of a part of the body is a symptom often seen.

An attack of convulsions may develop at any time in such a case, particularly if she is unduly disturbed or during attempts to drench her. The mere disturbance caused by the routine milking procedure is often sufficient to precipitate a fit, and many attacks of convulsions occur in the vicinity of the shed during or immediately after milking. In the convulsion the animal falls to the ground, usually flat on the side with the limbs stiffly extended and moving rapidly. The head is drawn back and the jaws clenched. The breathing is rapid and jerky and sometimes completely arrested for several seconds, apparently from spasm of diaphragm.

### Length of Convulsion.

The convulsion may last from one or two minutes to half an hour or longer, and may end in death, in apparently complete recovery (in which case the animal gets to her feet and seems nearly normal), or, more often, in a dull stupid state of semi-coma, in which she remains for one or two days before death occurs.

In acute cases the convulsive seizure may appear without any previous symptoms being noted. In many instances the animal is simply found dead, although apparently normal when seen a few hours previously. There may be signs that a fit has occurred and that the animal has struggled violently before death.

Finally, analyses of blood samples taken regularly during life show a considerable reduction in magnesium and a slight reduction in calcium.

### Post-mortem Appearances.

In general, it may be stated that there are no consistent lesions characteristic of this disease. Findings depend considerably on the time that elapses between the appearance of the first symptoms and death, and also on the time between death and the post-mortem examination. In some cases, where there are no previous symptoms and death occurs with first convulsion, everything may appear normal with the exception of blood-spotting in the heart wall.

Bloating of the paunch may occur soon after death, due to the animal being full of food. The lining of the fourth stomach and small intestine, in come cases, is congested, and, because of a rapid break-down of the blood after death, may have a dark red appearance. In cases where death occurs after one or two days of illness, the paunch may be only partly filled and the contents of the bible dry, but this appears to be only a result of the animal's not feeding.

Pneumonia is present in a percentage of cases as a result of inhaled drenches, &c. The state of the uterus depends on the length of time calved. In recently calved cows it may still contain blood-stained mucus and some placental debris. In cases which are calved longer it is clean.

### Diagnosis.

While it is desirable that veterinary aid or advice should be sought if available, it is also important that treatment should be applied as early as possible if it is to be of benefit, and that preventive measures should be adopted. For these reasons it is most necessary that the owner should know what he is dealing with.

It must be admitted that occasionally cases of milk-fever show for a short time the undue excitement and struggling characteristic of grass staggers, but these

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cases are not common. Milk-fever will be discussed later, but here it may be repeated that the length of time after calving is a useful guide, and animals which show staggery symptoms and go down within twenty-four, forty-eight, or seventy-two hours of calving, or just before calving, should be regarded by the owner as cases of milk-fever and treated as such.

The undue alertness, and nervousness, and the exaggerated response to any sudden noise or movement—and, if the animal should go down, the violence of the struggling in the early stage, with hurried breathing—should serve to distinguish grass staggers from most cases of milk-fever, in which the animal is usually rather dull and sleepy, and in which she lies quietly when she does go down.

### Treatment.

Many treatments have been tried, and all have occasionally been followed by recovery. The one which, in our hands, has given consistently the best results, particularly in the sub-acute cases or earlier stages, has been the giving of magnesium sulphate (Epsom salts) subcutaneously or by the mouth, if necessary followed by plenty of molasses and stimulants.

Drenching is always risky, as an attempt to give a drench to a cow in this excitable state often causes a convulsive attack. If, however, the animal can be drenched quietly and, if possible, still in the paddock, give about 6 oz. Epsom salts with 2 lb. to 3 lb. of molasses dissolved in a pint of warm water. If too nervous to be drenched or actually in a fit, the animal may be given 4 oz. to 5 oz. of Epsom salts dissolved in 6 oz. of boiling water and then allowed to cool to blood-heat. This may be injected by means of a funnel or tube and needle, or even with a hypodermic syringe under the skin, preferably in the side of the neck in front of the shoulder-blade.

Follow up, say in four hours, with a powder containing 3 drams of carbonate of ammonia in cold water as a drench. Molasses should be combined with all drenches. Further salts should be given the following day, and, even if recovery appears complete, small doses should be given twice a week for next two or three weeks.

Results with animals still on their feet are usually satisfactory. Animals remaining down in a semi-comatose state after a fit rarely respond to any treatment, but full doses of 4 drams of carbonate of ammonia with 1 dram of nux vomica can be tried twice a day, with plenty of molasses.

Because of the large number of cases in which death occurs too quickly to permit of any treatment, preventive measures are of primary importance and will be discussed later.

### *Theories as to Cause.*

The following are some of possibilities investigated during work on the disease :—

#### Absorption of Toxins from Uterus.

In recently calved cows (those calved within five to ten days previously) there is usually found in the uterus a certain

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amount of blood-stained mucus, and sometimes a certain amount, also, of the remains of the placenta. On one or two occasions hæmolytic streptococci have been found in this material.

In cows calved six or eight weeks, however, the uterine lining is quite clean. This may be disregarded as a cause of the disease. It is just possible that in isolated cases the presence of any septic material might have an unfavourable influence as a secondary factor.

### Intestinal Toxins.

Toxins formed by organisms of the Welchii group in the intestines are responsible for the disease in lambs known as pulpy kidney, in which death may occur during a convulsive seizure. Rose and Edgar in Australia have stated that they have recovered toxin of this type from a case of grass staggers in a cow. Numerous specimens were examined four years ago and again this past season, but in no case was any evidence of a toxin found.

### Disturbances in Blood Constituents.

Dr. Hopkirk has shown that if sheep are taken off a diet of dry feed and changed abruptly to grass feeding there is a drop in the calcium and also in the magnesium in the blood. The magnesium reaches its lowest point about four or five days after the change, and thereafter slowly returns to normal. There does not seem to be any deficiency of magnesium in the young grass, although its calcium content is lower than that of more mature grass.

Young grass is rich in protein and likewise in phosphates. This is accentuated where grass has been consistently top-dressed over a number of years. Waikato spring pastures have been shown to contain less lime and more protein and phosphate than those of, say, Taranaki, where, as already mentioned, grass staggers is not nearly so prevalent. Webster has well summarized the differences in protein content in a paper at the 1936 Grassland Conference, and his table may be quoted here.

| | Per Cent. Nitrogen. | Per Cent. Protein. |
|---|---|---|
| British pastures .. | 2·83 | 17·69 |
| Poor Southland sheep pastures .. .. | 2·6 | 16·25 |
| Poor Waikato sheep pastures .. .. | 3·61 | 22·56 |
| Wairarapa cow pastures | 4·27 | 26·69 |
| Taranaki cow pastures | 4·14 | 25·87 |
| Waikato cow pastures | 4·8 | 30·06 |

Calcium and magnesium, like sodium and potash, are bases, while phosphates and protein act as acids, probably causing a greater elimination from the body of the bases when they are in excess.

### Magnesium Deficiency.

It seems unwise to conclude that the condition of grass staggers is solely due to magnesium deficiency. However, such a deficiency may be set up experimentally in dogs, and it results in nervous disturbances and convulsive seizures somewhat similar to grass staggers.

During an outbreak of grass staggers in a herd, blood samples have on several occasions been collected from apparently normal animals in the herd, and have sometimes shown a magnesium content as low as that found in acutely affected cows. Blood samples from similar cows in an unaffected herd show normal magnesium.

The relationship of the condition to young-grass feeding was stressed by Sjollema in Holland, as previously mentioned.

In the Waikato one has regular demonstrations of the connection. A number of cases may occur simultaneously in a herd three or four days after being put into a particularly good paddock. In one herd, where four cases occurred at intervals, each was seen in the day following the change to the fresh paddock.

### More Evident in Flush Spring.

The disease is always more in evidence in a spring when the grass is fairly plentiful and when the growth during the critical period is rapid because of mild weather with sufficient moisture than in a cold, dry season, with the growth slow and delayed.

The influence of various top-dressings has been studied, but it cannot be said that any marked difference is found. The majority of top-dressing used in the Waikato is superphosphate, very often with a certain amount of lime. It is believed by some that slag is less prone to cause the condition, but outbreaks have occurred where slag had been used for the previous top-dressing.

The disease is not encountered in the Waikato in un-topdressed or very poorly top-dressed country. Although only a moderate amount may be used each year, however, once the fertility of the land is built up to such a stage that a rapid flush occurs in a good spring, then conditions are favourable to the occurrence of the disease.

The type of pasture has also been studied. In general, the most serious outbreaks have occurred in the better-class pastures with rye-grass and clover predominating, such pastures showing mainly rye in the critical period. There have, however, been certain exceptions where the pasture could be classed as mixed and only moderate in quality.

It seems reasonable to conclude that grass staggers is due to an upset in the mineral metabolism of the body, with a lowering of the blood magnesium, and that it is caused essentially by an animal which is already somewhat susceptible by reason of available minerals being at a low and unstable level through parturition and lactation being fed freely on young spring grass of forced growth.

### *Preventive Measures.*

So far, recommendations have been in two directions—(1) The control of grazing as far as possible to accustom cows gradually to the changed nature of the feed; and (2) the provision of additional mineral by licks, and the use of salts, &c., in drenching-water, or dolomite in ensilage.

### Grazing Control.

Where cases of grass staggers occur, a measure frequently tried with good results is to confine the cows to one or two paddocks until the grass is eaten out, and to feed hay or ensilage, or both, freely. While the farmer is naturally anxious to get the cows on to the fresh young feed as quickly as possible to increase production, the risks of any rapid change should be realized and the cows allowed the best paddocks only one or two hours a day for some days.

### Use of Molasses.

Molasses fed in hay after calving appears to be of value in preventing the condition. Dr. Cunningham found that molasses contained a considerable amount of calcium and magnesium—the actual figures in one analysis being: calcium oxide, 1·2 per cent.; magnesium oxide, 0·5 per cent.—and also that these minerals were in a readily assimilable form. Being a pure sugar, the molasses serve to balance the high protein of the young grass and induce cows to eat more hay.

The molasses may be first thinned with hot water and sprinkled over the hay, or, if the latter is baled, one or two bales may be soaked over-night in a tub of the solution.

### Use of Concentrates.

The experience of a number of farmers suggests that a small ration of bran or other concentrate fed daily is beneficial, as cases do not occur where this is practised.

### Supplying Additional Magnesium.

Dr. Cunningham carried out several experiments at Wallaceville, and showed that with both sheep and cattle the magnesium content of the blood could be raised either by adding salts to the drinking-water or by dosing with dolomite. On his suggestion both methods have been tried.

(*a*) *Epsom Salts (Magnesium sulphate).* — Epsom salts, being readily soluble, can be added to the drinking-water in the troughs at the rate of 1 oz. per cow per day. To ascertain how much to add to any trough, divide the capacity in gallons by the number of gallons each cow drinks daily, and the result equals the number of ounces required. The ball-cock must be tied and additional salts added at the same proportion each time the trough is refilled. We have taken 5 gallons as the approximate amount of water drunk in the spring.

This measure is practised by numerous owners with apparent success, and has proved useful in checking outbreaks. In certain instances, however, it appears to have failed. Since it involves some work and expense, and since one cannot say with certainty when cases may be expected on any particular farm, this method is probably better reserved to be put into practice immediately a case appears.

Where cattle do not water from troughs the salts might be supplied by dissolving them and sprinkling the solution in the hay.

(*b*) *Dolomite.*—Dolomite is a rock containing about 24 per cent. of calcium and 10 per cent. of magnesium. It is ground to a fine powder for use. Because of its insoluble nature it can be used only in feed or in licks. Dolomite in ensilage appeared the most practical way to supply it. It was added during the making of the ensilage at the rate of 5 lb. per ton.

It was estimated that a cow would eat about 50 lb. per day, so that a daily ration of 1½ oz. to 2 oz. of dolomite was provided for. It was advised that the treated ensilage be fed to calved cows, particularly during August and September. (In view of the evidence since collected that dolomite is of value in reducing the amount of milk-fever, this time should be extended to include a period of at least a fortnight before calving.)

### Experiments on Farms.

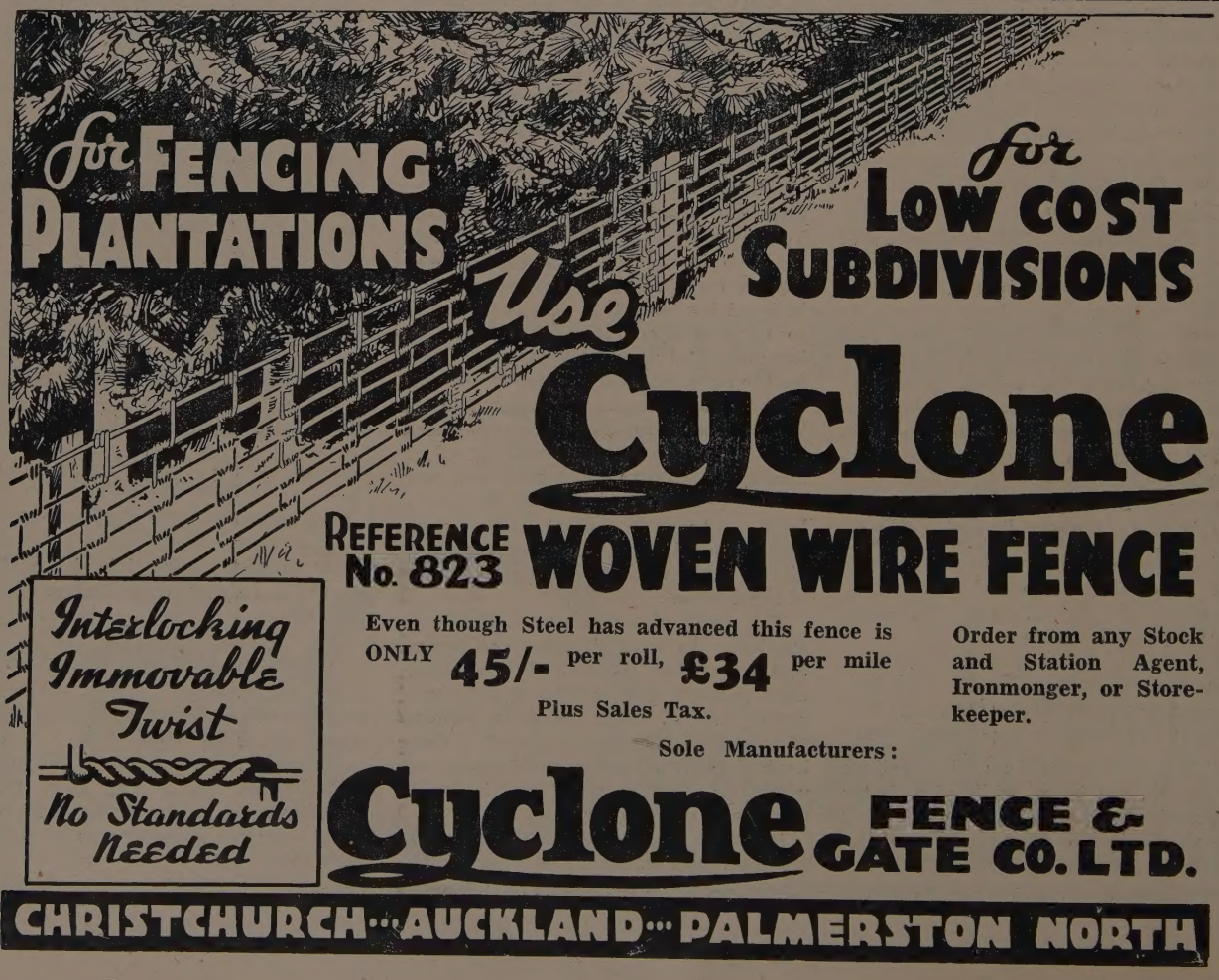
Dolomite was first available in 1934, and was first issued to four farms, on all of which grass staggers had occurred, for use in 1935. During the 1935 spring grass staggers was prevalent. On No. 1 farm dolomite was used as a lick, with plenty of molasses and Epsom salts. Two cases occurred, one recovering quickly without treatment, the other dying in spite of treatment. She had undoubtedly had some dolomite. The balance of the cows did better during the spring than in other years.

On No. 2 farm three cases occurred, but for some reason none of these cases had had access to dolomite. There was one case on No. 3 farm which recovered quickly with treatment—dosing with salts. There were no cases on No. 4 farm.

### The 1936 Season.

Dolomited ensilage was used on twelve farms, all of which had trouble the previous spring. On No. 1 farm five cows were lost. All had been affected the previous year. Some of the dolomite was fed, but accurate information as to the amount and period was not obtainable. Dolomited ensilage fed until mid-August on No. 2 farm. Two cases occurred in mid-September.

Unfortunately the ensilage was all fed out during the winter on No. 3 farm. Several cases occurred in September. One case occurred on No. 4 farm before dolomited-ensilage feeding was started. It was then used immediately, and no more cases occurred. On the remaining eight farms no cases occurred. Two of these farms belonged to one owner. On his third farm several cases occurred.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### The 1937 Season.

Grass staggers was prevalent this spring. Dolomite was available on twelve farms, including most of those used for the experiment the previous year.

Four cows were lost with grass staggers on one farm, and several cases of milk-fever occurred (No. 3 in 1936). On the remaining eleven farms no cases of grass staggers occurred, and there were only two cases of milk-fever.

While little reliance can be placed on a single experiment, these farms were selected because of cases occurring each year. Last year their neighbours were all having cases. It is felt that the results over three seasons justify the use of dolomite on a wider scale. The freedom of experimental farms from milk-fever in a season like 1937 would alone make it worth while.

The New Zealand Co-operative Dairy Co. has signified its willingness to assist in the distribution of dolomite, and it is hoped that by the next ensilage-making season dolomite will be available for purchase through the company.

### Dolomite in Lick.

On two farms where no ensilage was made the dolomite was used in lick form combined with salt, Epsom salts, and molasses, and was readily taken by the cows. A suitable mixture would be:—

| | |
|---|---|
| Common salt .. .. | 50 lb. |
| Dolomite .. .. | 50 lb. |
| Molasses .. .. | 2 gallons. |

This lick is specifically for use in the period when grass staggers is to be expected, and should be available for a fortnight to three weeks before calving and six to eight weeks afterwards—say, from early June until the end of September. It may be placed in boxes in the paddocks or fed in the bails, where it could be combined with small amounts of bran.

It is not an ideal lick for young stock or for areas on which specific deficiencies are recognized as calling for the supply of certain other minerals, such as phosphate in the form of bone-meal in phosphate-deficient areas, or cobalt in the bush-sickness districts.

### Conclusions.

Grass staggers is the result of an upset of the mineral balance in the dairy cow, and is to a large extent precipitated by the eating of the early spring grass.

Control measures are to ration the spring grass carefully so that the change is made as gradually as possible; to balance up such a high protein feed by greater amounts of hay, molasses, and starchy concentrates; and to increase the supply of minerals to all dairy cows over the susceptible period.

## *Milk-fever.*

As there are points of similarity between milk-fever and grass staggers and difficulty may arise in distinguishing between them, some notes on the former are added.

Milk-fever is a disease associated with parturition, and typically occurs within forty-eight or seventy-two hours of that event—occasionally just as parturition is about to occur, and rarely at from a week to a month later.

It is a disease of the mature cow, rare in second calvers, and unknown in heifers. Similarly, it is seen chiefly in the high producing animals. High condition is a predisposing factor.

### Cause.

Many theories, such as the formation of toxins in the udder or uterus, anæmia of the brain, and a lowered sugar content of the blood, have been put forward from time to time and then abandoned. While a complete explanation is still lacking, the work of Dryene and Greig, then of the Royal Dick Veterinary College, Edinburgh, enabled them to put forward the most satisfactory theory to date.

They have shown that in milk-fever cases there is a sudden marked drop in the calcium content of the blood, this returning to normal as recovery is brought about. In the animal body mechanism exists which normally should ensure that the calcium removed from the blood at the commencement of lactation to supply the colostrum and the milk is simultaneously restored by withdrawals from the stores in the bones. The percentage of calcium in milk is about ½ oz. per gallon, proportionately higher in colostrum.

The strain on this mechanism is thus highest in the best producing cows. When it fails the blood calcium falls and symptoms of milk-fever appear.

It is evident, however, that there are certain practical points having an important bearing on the occurrence of milk-fever.

### More Prevalent in "Grassy" Season.

It has frequently been noted, and it is known to many farmers that milk-fever is more prevalent in a "grassy" season than in a season when green feed is scarce, and also that where cows are calved off rather hard, dry pastures with a hay ration there is less milk-fever than where they are brought into green flushing paddocks for two or three weeks before calving.

The latter practice is sometimes adopted to ensure that the bowels are in a laxative state before calving, but this end could probably be better attained by the use of ensilage, molasses in hay, or drenching.

Dr. Hopkirk's work with sheep, already mentioned, seems to indicate that the change on to the green feed has some depressing effect on the amount of the general mineral bases of the blood.

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1-lb. tins, 2/3; 4-lb. billies, 6/6; 36-lb. tins, 1/4 per lb.

### Symptoms.

The first thing noted is usually a stilted, staggering gait, and animal is unwilling to move. As a rule, the general nervous disturbance and the acutely sensitive and easily startled condition present in grass staggers is absent. In exceptional cases which are known to suffer from milk-fever and low calcium there may be a stage of marked excitement, and struggling when the animal goes down.

In the typical case, once the animal goes down, which may be two or three hours after staggering is noted, she rather quickly becomes quiet and dull, with the breathing easy and regular, and with a tendency to throw the head around on to the ribs. The temperature is usually well below the normal level of 101·5 degrees, and may be 100 degrees, 98 degrees or lower. The pulse rate is usually about sixty.

### Treatment.

While veterinary aid is always desirable, under the present conditions it is frequently unobtainable. Prompt measures are necessary, so that the owner must usually act at once.

Although certain other disease conditions, such as fatty degeneration of liver, acetonemia, and, according to American writers, septic absorption from uterus, may occasionally produce similar symptoms, all animals showing the signs outlined above within forty-eight or seventy-two hours of calving should at once be treated for milk-fever.

The treatment adopted must depend on the stage of the disease. Where the cow is still on her feet staggering a calcium drench carefully given will often prevent further development. Such a drench would be :—

| | | |
|---|---|---|
| Calcium chloride | .. | 2 oz. |
| Molasses .. .. | .. | 2–3 lb. |
| Water .. .. | .. | 1½ pints. |

Another drench used successfully by Dr. Annett, of Matangi, is made by stirring 1 pint of molasses in 1 quart of boiling water, then ½ lb. of hydrated lime, filter through muslin when cool. This mixture will keep some weeks if bottled.

### Inflation of the Udder.

Once the animal goes down it is my experience that inflation of the udder must be done. The main essentials are a simple outfit properly sterilized, strict cleanliness of the udder and teats, and inflation until the udder is tight. It is very important that as soon as the udder is inflated the cow should be rolled up on to her brisket and maintained in a sitting posture with sacks of earth.

Where the animal is found flat out and paunch is badly bloated, she should be rolled into a sitting position for a few minutes before inflation is carried out, as this will relieve the bloat and do away with any need for tapping.

### Calcium Drench.

The calcium drench may be given while the cow is down, *if she is able to swallow*. There is always a risk of the drench going into the lungs if it is given while she is half-conscious, and no animal in a comatose state should be drenched.

Should the response not be satisfactory within a *few* hours, the calcium and molasses may be repeated, together with a stimulant dose of 3 drams of carbonate of ammonia and 2 drams of powdered nux vomica. The carbonate of ammonia and nux vomica may be repeated with molasses twice daily. Should there be any constipation, an enema of soapy water should be given and the amount of molasses increased.

Care in drenching must be stressed. Septic pneumonia is one of the commonest causes of death in milk-fever, either from the entry of foodstuffs into the lungs when the cow is down flat or from faulty drenching.

### Prevention.

Avoid flushing the cows with green feed before calving. The old advice to keep the cow on a bare paddock for a few days before calving still holds good.

Take every means of increasing the mineral reserves of the cows prior to calving, using licks containing either dolomite or steamed bone-flour. The addition of cod-liver oil is believed to aid assimilation of calcium. Burnt lime, chalk, or finely ground carbonate of lime should be added to the drinking-water. Lucerne hay or hay containing a good percentage of cow-grass or clover increases lime content of the diet.

Where numerous cases are occurring a calcium drench should be given to each cow immediately after calving. This should be done in any case with any high producing cows which are known to be susceptible to milk-fever, particularly if they are in high condition or calving rather late in the season.

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# Rugging of Flock Sheep.

## Scope for New Departure in New Zealand.

J. E. Duncan, Wool Instructor, Live-stock Division.

THE rugging or covering of sheep as a preparation for exhibiting them at shows has long been a common practice, but the rugging of flock sheep as a routine matter is not so well known. This latter practice has been on the increase in Australia for the last four years or so, having been started in a small way experimentally in 1934 in South Australia. To Mr. Spencer Williams, of the firm of Goldsbrough, Mort, and Co., Adelaide, must be given the credit of conceiving and initiating these trials. However, it may be truly said even in this case that "there is nothing new under the sun," for it is on record that the Greeks used to cover the fleeces of their sheep with skins to protect the wool.

At first sight the idea of rugging a sheep, the animal which provides clothes for our own backs, may seem a curious paradox, yet a little reflection will show it not to be so absurd after all. Nature designed the sheep as an active and extremely hardy mountain animal, used to living on sparse feed and rough precipitous country. Its fleece was in keeping with the conditions, and consisted of an undercoat of short fine "wool" for the retention of bodily warmth and a coloured outer coat for mechanical protection and the shedding of rain, and to harmonize with its surroundings.

### Modern Descendant.

Now consider its modern descendant—truly a triumph of the breeder's art, yet an artificial one, living under equally

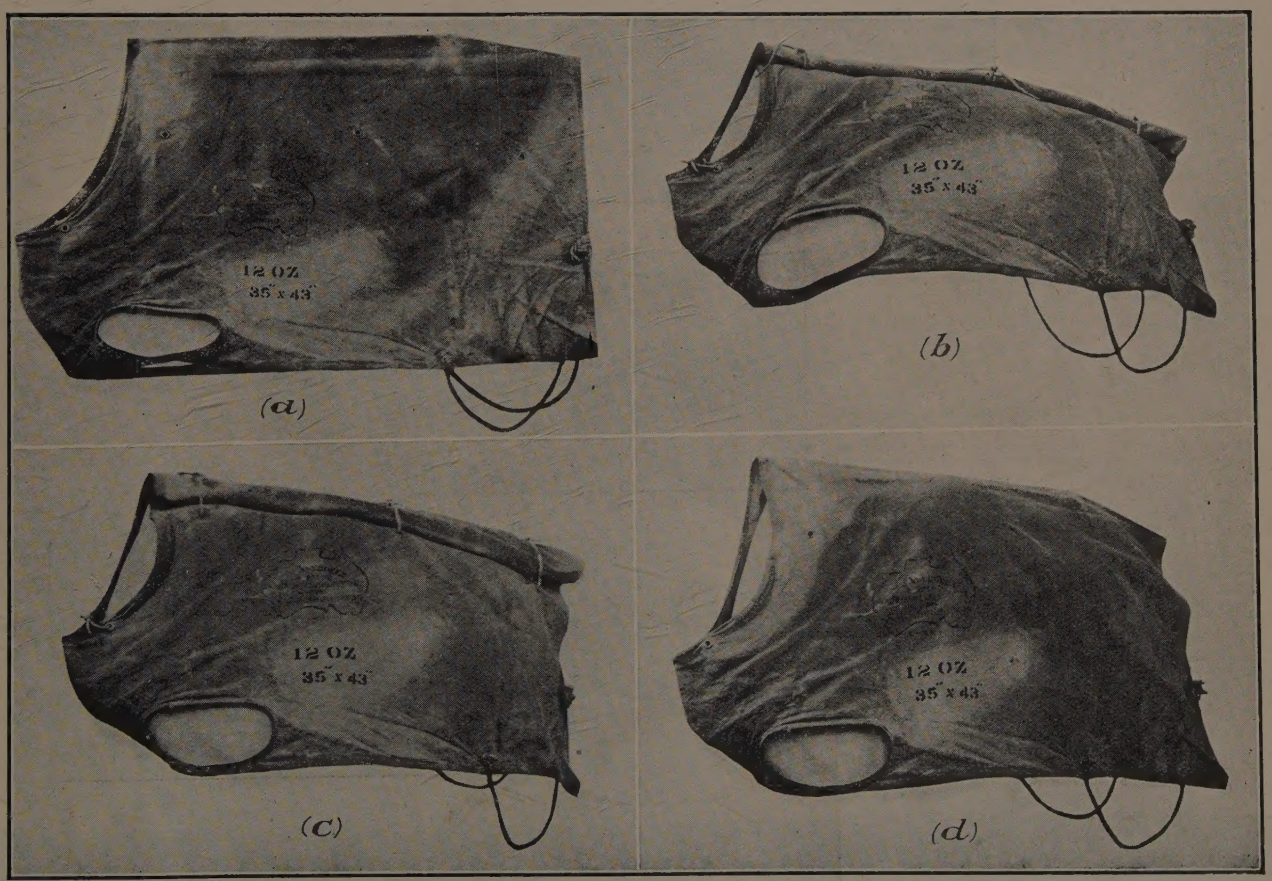


**Fig. 1.—Illustrations of an adjustable type of rug popular in Australia, and made of 12 oz. cotton duck: (a) The rug folded over flat. Note "arm-holes," leg-ropes, and eyelets for adjustment; these latter are duplicated on the side hidden from view. (b) The rug as it is adjusted for newly-shorn sheep; back portion tightly rolled down and fastened with three strong cord ties; chest tie also done up tightly. (c) Ties partially slackened off and back portion unrolled to allow for growth. (d) All ties removed to allow the rug to reach its fullest size. (Note that in (b), (c), and (d) the rug is draped over a white sack, which is showing through the neck and leg openings).**

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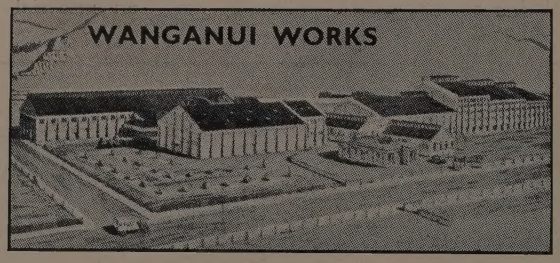


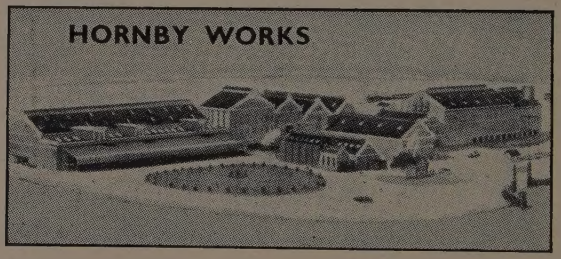


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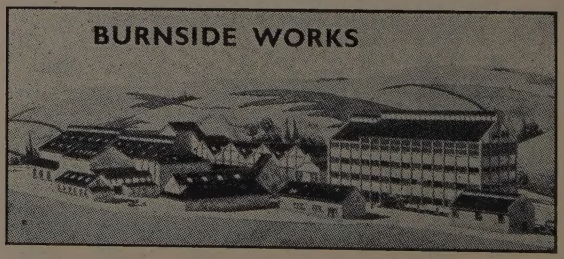


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artificial conditions. Here we have an animal moulded to suit our needs living mostly on man-made pastures under conditions of high carrying-capacity, which bring in their train their attendant problems of foot-rot, internal parasites, and so on.

The fleece has also been altered, with the aim of growing as much wool and as little hair as possible, and in bringing this about its structure and character have been changed out of all semblance to the original prototype. Some of the finer wools, such as Corriedale and half-bred, are particularly ill-adapted to withstand wet conditions, for here we have the staples standing straight on end and yet lacking that extreme density and abundance of yolk found in the Merino, which helps to keep out dirt and water.

It is no flight of the imagination to say that some sheep must at times be wet on the skin for days, and even weeks, at a time, for the same dense spacing of the wool fibres that causes them to stand straight out from the skin and allow easy entry to water also prevents the ready circulation of air and that relatively quick drying of the fleece which takes place in the longer and coarser woolled breeds.

### Effect of Dampness.

Apart from any consideration of the effect of prolonged dampness on the fleece, such as bacterial staining or even mycotic dermatitis ("woody" wool), and on the animal's general health, it means a needless waste of feed for the sole purpose of warming and drying the skin and wool. Conversely, if this extra feed is not available there is a drain on the body reserves for the same purpose and a consequent loss of body weight.

If the animal is kept dry by the simple expedient of covering, a much smaller proportion of the food will be serving simply as fuel for the maintenance of warmth, and a correspondingly larger proportion will be utilized for bodily growth. This simple fact is proved sufficiently by the greatly improved growth and condition of the covered hoggets in the flocks, which will be referred to presently.

Within the last year or so, two or three preliminary trials of the value of rugging have been undertaken in New Zealand, but it will be of interest before dealing with these to consider the results already obtained in Australia.

### Early Experiments in South Australia.

The early trials in South Australia in 1934 were on a comparatively small scale, but the rugged sheep were run along with others not rugged as controls, and in some instances careful records were kept of wool weights and prices, and in a few cases of body weights. These early covers were of crude design, being made on the farm from fertilizer or grain sacks, yet so outstanding were the results obtained that considerable interest was stimulated, which soon led to further and more extensive trials being undertaken.

It must be emphasized, however, that these earlier tests, using crude covers, were concerned more with keeping the wool free of dust and burr clover, both of which are troublesome in parts of South Australia, than with shedding rain or assisting growth rate of the animal.

### Later Australian Trials.

Since 1934 many other trials have been conducted in various parts of Australia. It would serve no useful purpose to review all these in detail, but will suffice to give a few salient features. The value of rugging under many conditions has now been proved beyond doubt, and the size of flocks rugged can now be counted in thousands instead of scores or hundreds. The latest advice at the time of writing is the rugging of a flock of thirteen thousand on one property.

One thing that quickly became apparent as the trials were extended to higher rainfall districts was that for good results something better than old sacks was required. Various materials have been tried, such as jute-canvas, calico, cotton-duck, &c., and it is now plain that so-called cheap rugs are really false economy, for in the long-run a more expensive rug will last longer and actually cost less per annum. Several manufacturers in Australia have now taken up the making of these rugs and sell them in various qualities and sizes.

### Cost of Rugs.

In Fig. 1 is illustrated a popular type made of heavy 12 oz. cotton-duck. The price, of course, varies according to size, but at present rugs of this type fitted with back and neck adjustments cost about 36s. per dozen in Australia for the hogget size. Other sizes are correspondingly dearer, up to 54s. per dozen for the largest type, which is suitable for big rams.

Finality in the design of rugs has as yet by no means been reached. Experiments are still being continued with different types of material, various

**Fig. 2.—A type of rug of 8 oz. green duck designed by Mr. A. C. Morton, of Massey College, for the covering of stud sheep and which has proved satisfactory in use. (a) The rug folded over flat; note the neck and rump extensions to conform to the shape of the animal's body. (b) The rug laid out flat to show the principal dimensions. The two long "tails" are brought round so that they overlap in front of the animal's brisket, where they are fastened together.**

systems of fastening, the effect of waterproofing, and so on, and will probably continue for a considerable time. One point already amply demonstrated is that the failure of some of the earlier rugs was due to a poor system or entire lack of adjustment.

If a rug is to stay on successfully it must fit the sheep well; therefore, it must be capable of adjustment to allow for the growth of the wool and of the animal, particularly so with hoggets. Some of the latest types adequately fulfil these requirements and have lasted under good conditions as long as three seasons.

### Wool, Carcass, and Financial Results.

In all fairness, both sides of the question must be presented, but so far the writer has heard of only one case in Australia of a man being dissatisfied after trying rugging, and this was because he bought rugs which did not properly fit his sheep and made little provision for adjustment. Therefore, the covers would not stay on. In one other case, under what were normally fairly favourable conditions, rugging showed no definite benefit as regards wool or carcass in the case of full-grown wethers. The number of favourable examples which could be quoted is now quite large, and these given are some picked out at random.

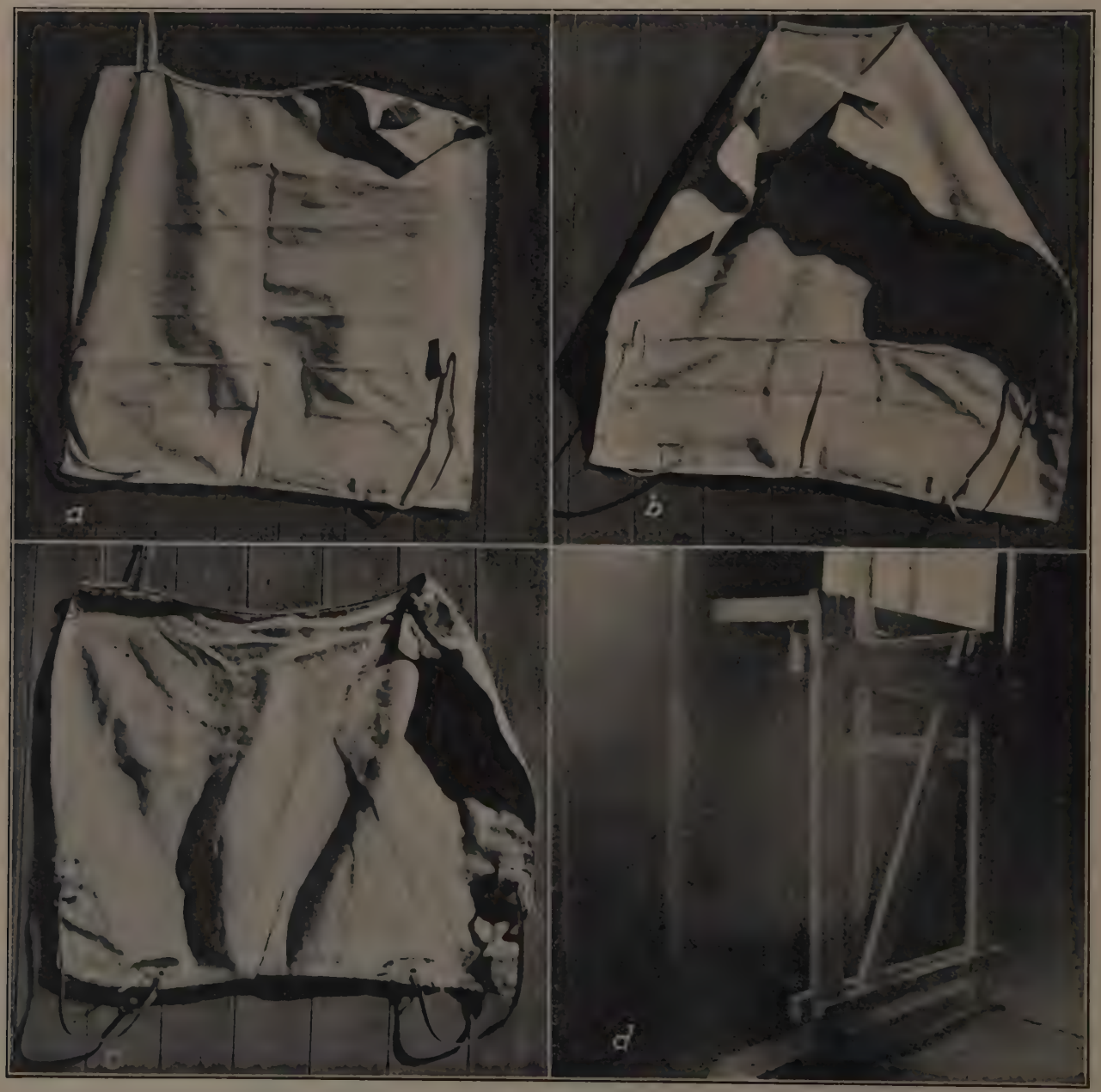

**Fig. 3.—(a) One of Mr. Jarman's new rugs. Note the overlap of material to help the rug to fit down over the animal's rump. (b) The same rug as shown in (a). Note the leg-straps and adjustable chest-strap. (c) A similar rug after a season's use—still quite sound. (d) The miniature ball for holding hoggets while attaching the home-made covers.**

At Halbury, South Australia, where dirt and dust are bad, the rugged sheep averaged 14 lb. of wool per head, as against 11 lb. from the controls. The rugged wool averaged 17·1d. per pound and the unrugged 14·5d. The additional cash return was therefore 6s. 8d. per head.

In the Balaclava district twenty sheep rugged from early October to mid-May returned 11s. 11d. per head for wool, as against 5s. 6d. per head for those unrugged.

On a New South Wales property the rugged sheep clipped 1½ lb. more wool per head than the unrugged, and after three months weighted 11·2 lb. per head more than the controls. There was also less fly strike in evidence among the rugged sheep.

After nine weeks of rugging seven Shropshire lambs averaged 55 lb., as against 47 lb. per head for those unrugged. They were all the same weight to begin with. The rugged ones sold for an average price of 30s. 7d. as against 27s. 10d. for the others.

In another case some lambs rugged with superphosphate-bags for four weeks averaged 21s. 10d. per head, as against 17s. 1d. for those unrugged.

### Valuable Data.

Probably the most valuable data is that collected by Mr. S. Williams, of Goldsbrough, Mort, and Co., Adelaide, because it applies to a comparatively large number of cases. From fifty growers who did trials every lot of rugged wool sold (season 1936–37) showed an increase in value of 1½d. to 6d. per pound over the corresponding control wool, with an average gain of 3d. per pound.

From the eighteen growers who kept wool weights the rugged sheep clipped from 1½ lb. to 2½ lb. per head more wool. Taking an average over all the growers concerned, the total costs were: Rugs, 1s. 9d. each; attention during the period of rugging, 6d.: total, 2s. 3d. The total *gross* average returns were 4s. 6d.—*i.e.*, a *net* return of 2s. 3d., or 100 per cent. return on the original outlay.

Mr. Williams attributes such failures as he has heard of to poor material or adjustments being used for the rugs, rugs not properly adjusted, and, again, rugs torn by running sheep on very rough scrub country. It also appears to be a mistake to leave the rugs on for a full twelve months, as the wool is likely to get too heavy in condition.

Better results have been obtained by rugging for, say, five months after shearing—namely, from early November until the beginning of April. The well formed and nourished tip will by that time be an adequate protection for the under-wool. Where excessive cold and wet weather is experienced, the rugging often gives good results when carried out in winter—mid-April to mid-August.

### Expert's Opinions.

It is of interest here to quote the opinions of Mr. R. C. Scott, Chief Agricultural Instructor, South Australian Department of Agriculture. He says that the sheep very quickly became used to the rugs; and that as sheep evaporate moisture through the mouth the rugs did not interfere with body temperature—in fact, the rugged sheep were actually cooler. (Elsewhere in Australia actual measurement in one case is claimed to have shown that the temperature near skin-level in the fleece of a rugged sheep was actually 15° F. cooler than that of a similar unrugged animal.)

Mr. Scott goes on to say that the grease from the wool soon rendered the rugs waterproof. The sheep were mated and lambed in all respects as usual, and "were travelled from field to field, run through the drafting-race, and yarded without any inconvenience whatsoever."

### Application to New Zealand.

These results from Australia look very attractive, but it must not be forgotten that conditions in New Zealand are very different both as regards climate and the type of sheep run. We are not faced to anything like the same extent with the problem of dust in wool, although in some areas sand is definitely troublesome. (Dust has been much worse than usual this year in parts of Otago and Southland because of the prolonged drought.) With regard to burrs, of which bidi-bidi, or hutiwai, is undoubtedly our greatest problem, covers might possibly serve a useful purpose. In general, however, we have a much higher rainfall than Australia, and this when combined with cold winters can have a detrimental effect on fleece and animal alike. It is more or less under these conditions that rugging has already proved successful in New Zealand in the cases now to be mentioned.

### Experiments in New Zealand.

Messrs. T. D. Jarman and W. W. Reddecliffe, both farmers in the Hororata district (Canterbury), where the average annual rainfall is about 29 in., are the two men who have already had one season's experience with rugging, and they are so satisfied with it that they intend to continue on a larger scale this year. In both cases the trial has been confined to hoggets, and, as will be seen from the data submitted, has been definitely successful as far as it has gone. It is well enough known that the hogget stage is the most critical in a sheep's life, and any assistance to the animal at that period, although seemingly small, may make all the difference between a healthy four-tooth and a skin hanging in the woolshed.

In Mr. Jarman's trial five hundred Corriedale hoggets were covered. The covers were put on at the end of June (1937), when the sheep were eight to nine months old, and were removed at the end

**Fig. 4.—(a) A type of commercially-made cover, which is joined in front. Note the double eyelets for the straps. (b) One of the earlier home-made covers.**

of October—*i.e.*, after four months. The covers were of jute-canvas, fitted with neck and leg straps as shown in Figs. 3, 4, and 5, weighed about 1½ lb. complete, and were made in Christchurch for 2s. 9d. each.

At least 80 per cent. of them are fit for another season's use. Mr. C. B. Hercus, Mr. Jarman's manager, is of the opinion that a large number will do three seasons.

### Wool More Attractive.

The wool from the covered hoggets was considerably cleaner and more attractive in appearance, a little longer, and averaged for a four-bale line 1d. more per pound. No figures are available for fleece weights, but Mr. Jarman's manager knows from the number of bales pressed at shearing that there must have been a substantial gain in fleece-weights due to covering.

No figures were kept for the body-weights of the sheep, but for the trial the five hundred poorest hoggets in the flock were selected, and at the end of the season they were definitely the best hoggets in the flock. Certainly when I saw them in mid-April they were a good line of sheep.

### Adjustments when Needed.

The hoggets were under frequent observation, and adjustments were made as soon as needed. Some trouble was experienced through the hoggets chewing the leg-straps on each other's covers, but it is hoped to overcome this by dressing them with something distasteful, such as kerosene. So far, the Australian method of cotton-rope ties (see Fig. 1) has not been tried at Hororata.

Mr. Jarman's manager intends to do eight hundred hoggets this year, covering them at the beginning of May and removing the covers at the beginning of October. Fig. 5 (*a*) is a picture of a few covered and uncovered hoggets in Mr. Jarman's yards.

In Mr. Reddecliffe's trial three hundred Corriedale hoggets were covered. The covers were put on in the middle of April (1937), when the sheep were about seven months old, and were taken off at the beginning of November—*i.e.*, after six and a half months.

The covers in this case were home-made from a large roll of jute-canvas (32 in. wide), and the cost for material was 9½d. each (see Fig. 4 (*b*)). They were attached to the sheep by stitching them with twine to the wool at three points along each side. The stitch was taken through the cover, round a couple of staples of wool, back through the cover, and then tightly tied. Mr. Reddecliffe used a small bail (similar to a cow-bail, and illustrated in Fig. 3 (*d*)), erected in the wool-shed, for holding the sheep while this was being done. He said the covers stayed on quite well, but frayed badly at the edges for the want of a hem.

### Locally-made Covers.

This year, however, he has had covers made in Christchurch at a cost of 2s. 11d. each. They are of similar material, but are provided with leg-straps (see Fig. 4 (*a*)). A noteworthy feature is that the leg-straps pass through *double* eyelets at each end. This not only makes them stronger, but also means that the knot on the end of the strap is inside the cover where the hoggets cannot chew it. Mr. Reddecliffe expects that more than half of these covers will last for three seasons.


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**Fig. 5.—(a) Several covered and uncovered hoggets. (b) Some of Mr. Reddecliffe's covered hoggets.**

The wool from the covered hoggets was much more attractive, was quite free from chaff (a certain amount of which was present in the uncovered wool, due to supplementary feeding), and showed very little wasty tip. It was not sold separately from the uncovered wool, but Mr. Reddecliffe was very pleased with the results, and estimated that the fleeces from the covered sheep were at least 1 lb. per head heavier.

### Hoggets improve.

He is also of opinion that the covered wool must have netted 2d. to 3d. per pound more, because this is the first occasion since he has been farming at Hororata on which he has had better prices for his wool than any of his surrounding neighbours.

The hoggets in question were the poorest in the flock before covering, and at the end of the period of covering were, in Mr. Reddecliffe's opinion, the best he had ever had on the place. He intends covering all his hoggets this year, and had already started when I visited him in mid-April (see Fig. 5 (*b*)). He was also thinking of trying the effect of covering a number of his four-tooths which had been covered the previous year as hoggets.

### Discussion and Conclusions.

Although it is fully realized that the details of trials carried out in New Zealand are not as full as they might be, yet it is hoped that they will be sufficient to stimulate further interest in this topic. I feel that there is definite scope for this new departure in sheep-management under certain conditions in this country.

High rainfall, cold winters, prevalence of bidi-bidi, dust, and sand, contamination of wool with supplementary feed, a heavy mortality rate among lambs and hoggets —a combination of any of these circumstances might make rugging worth while. We will not know until we try it, for this is a case where a little practice is worth a lot of theory.

At the moment, the rugging of sheep on rough scrub country, where the covers would be torn or the sheep "hung-up," and where they cannot be regularly supervised, appears to be a very doubtful proposition, but experience and experiment may solve this difficulty.

I hope next season to have additional and fuller particulars of the trials at present being undertaken, and these will be published in due course. In the meantime I shall be interested to hear from any one else who has had experience of rugging, for the more authentic information the Department can gather the more service can it be to the farming community generally. From the photographs I have taken I hope the general design and appearance of the rugs in use will be clear. Should any farmer desire further particulars I shall endeavour to supply any available.

### Acknowledgments.

I wish to thank Messrs. Jarman, Hercus, and Reddecliffe for their co-operation and permission to publish these results, Mr. B. Grant, Chief Inspector of Stock, Christchurch, for helpful assistance, and Mr. A. C. Morton for the loan of the covers shown in Figs. 1 and 2.

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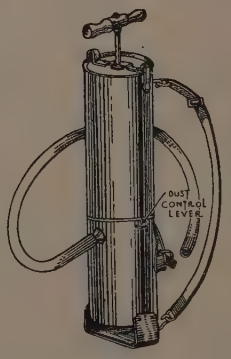


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# Supplementary Stock-feed.

J. G. McKAY, Instructor in Agriculture, Christchurch.

IT is estimated that approximately 124,300 acres of turnips and 159,000 acres of green fodder were grown in Canterbury in the 1936–37 season to provide supplementary feed for stock. Under conditions which prevail in Canterbury in most seasons some early preparation of the land for such crops as turnips, rape, and kale can be regarded as essential if good strikes and comparatively clean crops are to be obtained. Land intended for summer sowings should be ploughed early and worked down before dry conditions set in.

This early breaking-down of the furrow, besides helping to conserve the moisture so essential to an even strike and rapid growth, also encourages germination of annual weeds, which may then be eradicated to some extent before the crops are sown. This treatment applies more particularly to land which is comparatively free from twitch. The success attending methods adopted in the eradication of any plant of a twitchy nature is largely dependent on weather conditions.

### Eradication of Twitch.

On the deeper soils where old pastures have run to twitch, the twitch then being shallow rooted, good results may be obtained from one deep ploughing followed by suitable cultivation and the sowing of oats and vetches as a smother in autumn, the resultant crop being harvested for hay or seed. This method has its advantages where the oat and vetch crop can be profitably utilized.

Where large areas require to be handled, however, the growing of smother crops is often not practicable, and because of the harm which may result from one deep ploughing through burying the twitch without killing it the more general practice is to endeavour to surface kill before deep ploughing takes place.

With such a method it is an advantage to have the land in a rough condition during the process of eradication, and to this end the plough itself is a useful implement, as, by skim-ploughing and repeating the operation in dry periods, most of the twitch may be killed in the rough sod. Subsequent grubbings or cultivations are generally necessary before deep ploughing, but undue pulverizing and consolidation of the land in the early stages should, if at all possible, be avoided, as such a condition encourages fresh growth of the twitch and makes eradication more difficult.

Generally, the turnip as grown in Canterbury is not regarded as a clearing crop. To some extent this is true, as most of our crops are grown at 7 in. or 14 in. rows and do not therefore lend themselves to intercultivation, but the amount of cultivation usually given to twitch-infested land before sowing and the subsequent grubbing out of the turnip shells greatly aid in cleaning up such areas.

The practice of sowing turnips and rape through every other coulter of the drill is now largely superseded by sowing through every coulter, experiments having shown that heavier per-acre yields are obtainable from the closer spacing.

### Fertilizer Mixtures.

Extensive trials with various manures indicate that superphosphate and carbonate of lime mixed in equal parts a few days before required is the most satisfactory manure to use with turnips. This mixture does not retard germination, and applications of from 2 cwt. to 4 cwt. per acre sown with the seed will give good results. Increases in yield may be obtained from cross-drilling 1 cwt. of super into the turnip-crop when the plants are a few inches high. Apart from the stimulating effect of fetilizers thus applied, the drill coulters serve as cultivators and by their action will eradicate a percentage of weeds when these are present in the crop.

For green-feed purposes Algerian oats and Italian rye, apart or in combination, are general favourites. Dun oats provide a lot of feed in spring, but are not the equal of Algerians for winter production. As a green feed Algerian oats are right popular; under favourable conditions they produce a lot of feed. Early


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autumn-sown crops can be fed off in winter and spring, and, if no longer required for green-feed purposes, may be harvested for chaffing. If conditions are dry these late-fed crops do not usually produce the best of material, but even though not first class the chaff is of value as an addition to turnips for wintering sheep.

Cape barley and Black Skinless barley are used to a limited extent for green feed and both are rapid growers under favourable conditions.

**Black Barley's Rapid Growth.**

Black barley is particularly rapid in growth and suitable for the production of early autumn feed, and, although at times regarded as being somewhat unpalatable to stock, will generally be found quite satisfactory in this respect if the growth is not allowed to become rank. A seeding of 2 bushels to 2½ bushels per acre of the cereals mentioned is a sufficient quantity to sow on the medium Canterbury soils. On heavier soils seedings of up to 3 bushels per acre are sometimes used. With these heavier seedings it is an advantage to drill and cross-drill the seed, sowing half the required amount each way.

When grown for haying or ensilage 1½ bushels of Algerian oats to an equal quantity of Scotch tares drilled and cross-drilled is a suitable mixture to sow, and may be sown at any time during late autumn, winter, or early spring, providing the land is in a suitable condition for sowing.

With all these crops 1 cwt. or more of superphosphate per acre can usually be applied with profit.

In sowing Italian rye-grass or Western Wolths alone, if time permits of a short fallow and thorough preparation of the seed-bed, excellent results can be expected from broadcasting the seed. Following a grain crop, however, these fallows are not as a rule practicable, and in such circumstances quicker establishment is obtained for drilling and applying 1 cwt. of super with the seed. A seeding of from 25 lb. to 30 lb. per acre is a sufficient quantity of seed to sow.

There is probably little true Western Wolths grass procurable, much of the seed sold under that name being Italian rye-grass. Italian rye-grass is highly palatable, and is regarded as a quicker fattener than the green-feed cereals. Moreover, stock are not so liable to bloat on it as on oats or similar green feed. Certified seed of high producing strains of Italian rye-grass is now available, and the use of such seed is strongly recommended.

# Porkers and Baconers.

## Adjusting Pig Numbers to Feed-supply.

C. H. M. SORENSEN and M. J. SCOTT.

WHAT a simple business pig-keeping would be if there was always just the right amount of feed on hand to supply all pigs with enough to eat. Where stored grain is used in quantity, this state of affairs is readily possible; but where skim-milk is the bulk supply, as in New Zealand, the difficulty of having enough milk and enough pigs is a very real one. An abundance of milk in spring and summer with insufficient pigs to use it profitably, or a shortage of feed in winter with hungry pigs, are the problems that have to be faced.

The rapid expansion of the industry in the last few years is evidence that many thoughtful men have given attention to these problems, and have found ways out of the difficulty. In general, two main processes have been adopted on the most successful farms:—

(1) Sell porkers when the milk-supply is failing; feed them on to bacon when there is plenty of milk.
(2) Winter some pigs so as to have these pigs to carry on to bacon.

### Wintering Pigs.

Pigs just weaned can be carried through the winter for three months with ½ lb. of meat-meal per pig daily, and with ½ ton of roots per pig at a feed cost of 45 lb. of meat-meal—say, 5s. and 2s. 6d. for roots. On this ration pigs of 40 lb. live-weight at the beginning of June will be 70 lb. by the 1st of September. If they get 1 lb. of meat-meal they will be 85 lb. by September, and if they get 1½ lb. of meat-meal they will be 105 lb. Half a gallon of milk daily in June is very desirable for these weaners, but if they are heavier by the beginning of June—say, 60 lb. live-weight—the milk, though useful, is not necessary.

After pigs are from 60 lb. to 70 lb. weight they have passed out of the baby stage, during which extra care in feeding is very desirable. By having sows farrow in February, these pigs can be 60 lb. by the end of May. February farrowing makes wintering in this way decidedly easier. The more advanced the pigs are by the 1st June the greater the satisfaction in wintering them.

Because meat-meal has to be purchased, some are averse to using it, especially where they have their own supply of grain. When ½ lb. to 1½ lb. of grain is used daily with roots for wintering pigs in the absence of meat-meal, the results are satisfactory, but not so good as where meat-meal is used. At least that is the finding of the Ruakura experimenters published in the *New Zealand Dairy Exporter* in November, 1937.

It will be noted that roots were costed at 5s. per ton. Readers will smile, be irate, or agree, depending on their disposition. Where heavy crops can be grown, 60 tons to 80 tons of roots at 5s. per ton shows as much profit for an acre as most other crops do. At 60 tons to the acre, 1 acre of mixed roots should be enough to winter sixty pigs and provide supplies for sows and other contingencies. Sixty pigs consuming ½ ton of roots during the winter would absorb 30 tons, while ten sows over the same period consuming 1½ tons each would account for an additional 15 tons. This would leave 15 tons to be used in the late autumn, for finishing porkers or in early spring to keep the wintered pigs going till there is sufficient milk. A few carrots and pumpkins for autumn, and swedes, pumpkins, or mangels for the rest of the year, would be ideal. Whichever gives the biggest yield per acre, that is the best crop to grow. If the pigs are fed in a fairly big paddock to keep them out of the mud, and have decent shelter, success is assured.

These wintered pigs are usually the first baconers of the season. Either because they have to be got rid of quickly, to make room for oncoming pigs, or else because there are insufficient other pigs to use all the skim-milk, these baconers are fattened with indecent haste, with the result that they are degraded for over-fatness. On the other hand, every pig has a definite chance of being classified


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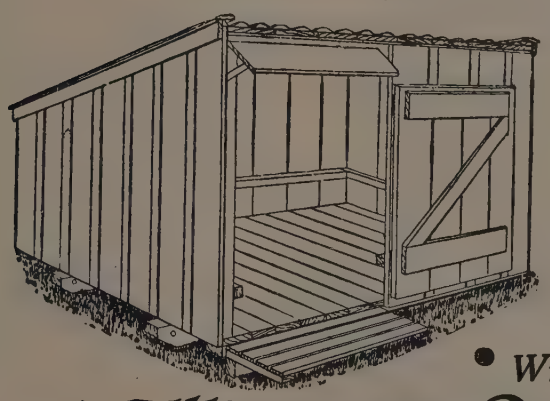

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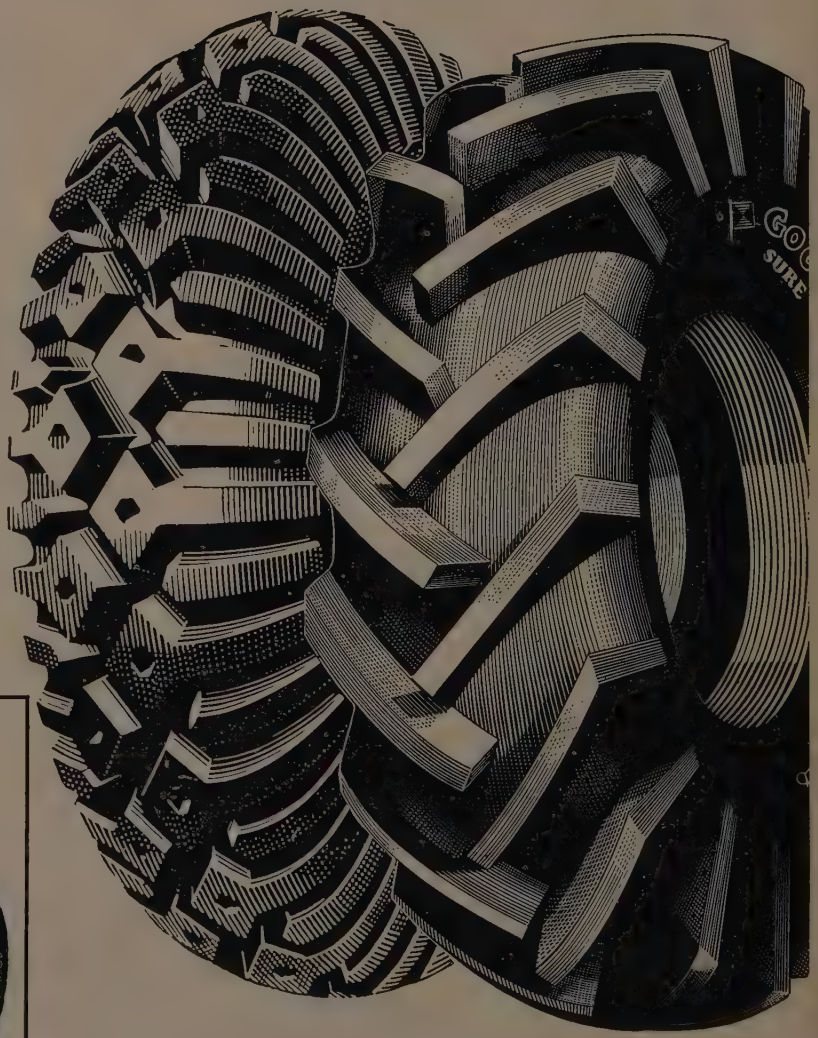


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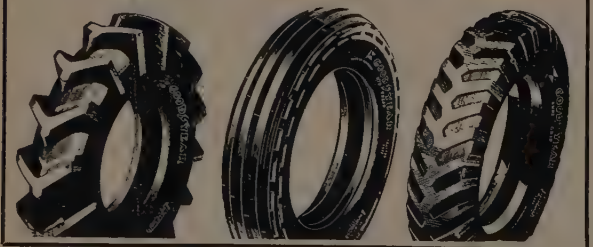

GOODYEAR

as No. 1 prime by taking them on more slowly, especially over the last month or six weeks. It is impossible to define just what adjustments have to be made in pig-numbers and farrowing dates to do this, but it can be facilitated by having some of those roots still on hand, up till November, and feeding them either to fattening pigs or to the younger ones in order to adjust the feed-supply to pig-numbers.

It seems that there are fundamental reasons behind this slow finishing of pigs that have had a check. The normal development of the animal is arrested by the winter-store period, with the result that when abundant feed is provided there is a tendency to deposit fat instead of lean meat. Most farmers have noticed this decided thickness of the head and neck with a tapering of the hams at the end of winter, which seems to disappear as they reach the final stages of fattening. The disappearance is only apparent, since such pigs have 10 per cent. to 15 per cent. more fat than the pig of the same weight that has grown normally and without a check from birth to slaughter.

The fat is not wanted by the trade, especially since abnormal fat tends to be associated with softness, fishiness, bad colour, rancidity, and waste. In trials at Ruakura pigs wintered on roots and finished with 10 gallons of buttermilk daily graded 60 per cent. of No. 2, and were ¼ in. thicker on the shoulder than similar pigs finished with 5 gallons of buttermilk daily, all of which graded No. 1 prime. Another ten finished on 6½ gallons of skim-milk were degraded for thickness over the loin. Out of two other groups of ten each finished with 4½ gallons of skim-milk, nineteen were graded No. 1 prime.

### Summer Bacon.

The other class of baconer born in July and finished in January does not receive such a severe check as the wintered pig, but nevertheless turns out an improved pig if fed as fast as possible to 70 lb. live-weight and then finished off more slowly. McMeekin's results proved this up to the hilt, if proof is now necessary.

Much can be achieved in the way of improving both pork and bacon if the types for these two classes are selected when the pigs are 100 lb. live-weight. The short, dumpy pigs make best pork, the longer ones best bacon. A pig that is less than 28 in. at 70 lb. carcass-weight (100 lb. alive) from the root of his tail along the back to a line behind his ears should go for pork; a pig that is more than 28 in. should be kept for bacon. They can be measured, not accurately but comparatively, with a ruler as they feed. By this means, pick out the pigs that show length, fine shoulders, and a good constitution. Turn the rest into pork, remembering always that the worse the conformation the greater the need to get the pig away in the light porker class.

### Roots for Autumn Porkers.

In the autumn, when dairy-products begin to fail, some supplementary feed must be available to finish off many of the pigs that now go down the chute for emaciation. The question of the unfinished pig is a very serious one, and those who are interested would be well advised to see for themselves how grave it is by visiting any export works in the autumn months. Some one has to pay for slaughtering and handling condemned pigs, and this payment must be a serious drain on the return from sound pigs.

### Pork v. Bacon.

From a perusal of the above it must be now apparent that the alternative of producing pork or bacon does not arise in New Zealand, whatever advice we may


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have received on the subject. We must produce both pork and bacon in order to adjust feed-requirements to our day-to-day milk-supply. For a number of years to come we should be able to find four out of every ten pigs produced that will make first-class baconers. At a later date, by improving our type, it should not be difficult to supply six or eight as bacon out of every ten produced, should this be necessary. Hence, in spite of statements to the contrary, it would seem that our present type of pig can be improved to fill the bill.

At present we provide half of Great Britain's imported pork, but only a few per cent. of her imported bacon. We could supply ten times as much bacon and find a ready market for a quality product. While the matter will be decided in the long-run by price and other considerations outside the domain of the producer, it cannot be questioned that the production of bacon has been invaluable in solving the feed problem, and thereby improving the returns from pigs.

Bacon-production facilitates the consumption of increased quantities of cheap home-grown feed, unusable for pork-production, and by so doing reduces the overall feed-costs. Attention to the right selection of baconer type and the appropriate use of cheap feeds as outlined above can further enhance the quality and the profits of the industry.

# Labour-saving Device for Pig-feeding.

H. A. BAYLEY, Inspector of Stock, Whangarei.

THE selection of a suitable site for a piggery on hilly dairy-farms is often a difficult matter, especially when finance cannot be found for piping and skim-milk pumps. Usually the alternative is hard work, with loss of time.

The owner of one such farm has solved this difficulty in a very simple and inexpensive way. The milking-shed is situated on the side of a hill which becomes very steep lower down, terminating at a wide stream, which is always in flood during heavy rains.

An ideal site was offering across the creek, but difficulties were presented in several ways when feeding was considered, as the distance was approximately 2 chains.

The owner solved this problem by erecting two suitable and well-secured strong posts, one near the milking-shed, the other near the piggeries. A length of No. 8 plain wire with a small pulley attached was secured between the posts. The trough was made rather longer than usual, so that about 3 ft. of it was on the outside of the fence. From some portions of galvanized iron he made a receptacle with a wide top and narrowing to fit in the trough. A post on which was secured a piece of forked tea-tree was attached to this.

Kerosene-tins were thickened in the bottom with an outlet such as is provided in the usual kitchen sink, the chain attached to the plug being secured to the handle.

When filled, the tins are hooked on the pulley and then run along the wire, being steadied by a thin check rope. The chain attached to the plug and handle comes in contact with the forked tea-tree, which pulls out the plug and allows the milk to run through the receptacle into the trough. The tin is pulled back by the check rope.

Much walking, time, and labour are saved, and work which formerly took half an hour is reduced to ten minutes.

# Winter Feeding of Sows.

C. E. BALLINGER, Assistant Experimentalist, Ruakura Farm.

THE feeding of brood sows, particularly during the winter months, is of extreme importance for the production of good litters in the following spring. If a sow has suckled a large litter the previous autumn she will have lost probably 30 lb. of body-weight in her eight weeks' suckling-period. This loss of condition will take place even if she has been well fed until weaning.

It is a common practice to turn the sow out to graze in a cow paddock after weaning with pasture as the only source of feed. If roots are being fed to the dairy herd the sow may also get a few of these.

Under such conditions a sow has no opportunity of regaining her condition and building up body reserves for the production of the next litter. The sow, unlike the sheep or cow, has no store period, and the quantity and quality of pasture during winter is quite insufficient for the production needs.

The problem is easily overcome by growing small areas of root crops and by feeding them with a protein-rich meal or a small quantity of skim-milk. Roots are deficient in protein, the supply of which is so necessary to the sow for the production of healthy litters.

The best form of protein is skim-milk or meat-meal, and a sow should receive 2 gallons or 3 gallons of the former or 1½ lb. of the latter per day. With these quantities should be fed as many carrots, pumpkins, or roots as the sow will consume.

Sows will consume about 30 lb. or 40 lb. of roots a day without any ill effect, providing meal or skim-milk are also fed. Roots are bulky and should be fed in small quantities to begin with and gradually increased.

About five or six weeks before the sow is due to farrow the ration of bulky roots should be reduced and replaced by 4 gallons or 5 gallons of skim-milk and meals. This will be the final preparation of the sow heavily in pig in the period during which the young are developing rapidly. An adequate ration over this period is essential if the sow is to produce and rear a good healthy litter.

# Handling of the Potato Crop.

C. C. Leitch, Fields Instructor, Timaru.

To a large number of farmers the potato crop is quite an important cash crop, for it represents approximately £500,000 to £600,000 in value to the Dominion. Canterbury grows, on the average, 12,000 acres to 14,000 acres annually. It will be seen from these figures that it is an important crop on a number of Canterbury farms, but unfortunately it is a crop that does not always receive the care and attention it deserves.

Frequently complaints are received from North Island purchasers of the unsatisfactory state of some of the deliveries. This unfortunate state of affairs can be obviated to a large extent if more care and attention is given to the handling of the crop at and after digging.

The potato crop is rather expensive to grow if all costs are taken into consideration; but, nevertheless, if good seed is used and average prices and weather conditions prevail it more than compensates the producer for his outlay.

Many growers pay particular attention to cultivation, manuring, and care of the crops during the growing period, but there are certain operations which must be carefully carried out in order to ensure the grower receiving a maximum return for his efforts.

### Planting and Moulding.

The best results are obtained by planting 2 in. to 3 in. deep, either with a planter, plough, or mould plough, all methods having their good points. The planter gives the best results on clean, free ground, which is convenient in that manure can be applied at the same time. Manure-boxes which can be fitted to ploughs are also obtainable. One feature of planting with the plough that requires stressing is that it is essential to have soil with free subsoil; otherwise, with a heavy rain soon after planting, the water is apt to lie in the bottom of the furrow and rot the tubers. The mould plough is best suited to land of rather a stiff clay subsoil.

Rows 28 in. to 30 in. apart generally give the best results, as closer planting than this will result in difficult moulding and digging.

If a good mould is not made, the tubers push through and become green, and if the season is dry the tubers are open to attack by the potato-moth. One frequently sees potatoes moulded with a very wide top to the row, but as the crop matures the potatoes are gradually pushed to the top, where they become exposed to the sun and thus become green. The best mould is made by the mould plough. In districts where blight is prevalent, moulding the rows very sharply will help to check infection, the blight spores being carried down the side of the row instead of being deposited on top, where they are likely to be washed into the soil and infect the tubers.

**Fig. 1.—The "elevator" type of potato-digger at work.**

### Mechanical Digging.

When digging with a digger, care should be taken to ensure that the spugs on the wheels are running clear of the potatoes; otherwise the latter will be crushed, resulting in a loss to the grower. Diggers are now being fitted with pneumatic tires, and this should result in a great saving. It is often a good plan to reverse the spugs on that wheel of the digger which runs alongside the row of potatoes which is not being lifted.

Most diggers are fitted with steel aprons which are agitated by a sprocket wheel. If the digger is driven fast the potatoes are bumped about and become bruised, and ultimately rot. If the earth is dry it will be found that by the time the potatoes reach the top of the first apron they are free of earth, and in this case the second apron is unncessary and should be removed to prevent them bumping about unprotected on the bars of the apron.

In these days, with the power take-off attached to the digger, more care than ever should be taken to see that the potatoes have a good covering of earth to protect them. If this is not possible, remove the sprocketed roller and put in a plain one, thus reducing the agitation and also the speed of operation. It is only a matter of time until most diggers will be fitted with an apron having a rubber coating over the bars.

If the potatoes are planted too deeply it is often difficult to get the digger in far enough to lift them, which results in a number being sliced. It is often necessary where a horse-drawn digger is used to put in an extra horse so that the digger can be put in deeper to avoid this slicing. Often it is due to carelessness on the part of the operator.

### Hand Digging.

In hand digging the work of the diggers is made a good deal easier and there is less loss from spearing if the potatoes are planted further apart, 15 in. to 16 in. being the recognized distance for hand digging. They can be planted closer if the digger is used. Digging by hand is an operation for the expert, and, unfortunately, the good fork digger is becoming

scarce. The good digger will hardly mark a potato, but an inexperienced man can cause a large amount of damage by spearing and scraping in the act of digging.

### Handling of Bags.

Much needless damage is caused by the dumping of potatoes into tins and bags. Potatoes can be handled quickly and efficiently by the experienced man. On some farms baskets similar to a baker's basket are used, the bottom being covered with crossed wires to keep the potatoes in, but allowing the dirt to fall through. The dumping of the bags into the lorries and drays causes the potatoes to be bruised and crushed, resulting in a loss to the grower.

### Time of Digging.

Potatoes should not be dug until the skins are quite firm and until the earth has cooled. Digging potatoes in an unripe state generally results in heavy losses. Rain and a slight frost or two help to firm the skin on the tubers, and they will then handle more easily and with less likelihood of damage by bruising, &c.

Potatoes should be dug in an immature state only when they are going into immediate consumption. These remarks apply to the main crop, and not to potatoes that are grown for the early market.

### Pitting and Storing.

Faulty covering of the potatoes after they are dug is another source of loss to the grower. If the potatoes are to be pitted a well-ventilated pit should be made, and the site should be on a high, dry part of the field. Another method which is coming into favour is the use of baled straw for the sides of the pit, which is then covered with straw.

In some districts the potatoes are stored in bags, these being covered with plenty of straw on top and with bags hung down the sides to prevent frosting. Carelessness in the covering of potatoes results in big losses to growers. It must be remembered that the potato crop is valuable and that a little extra time spent to ensure that the stack is weather-proof is warranted.

**Fig. 2.—A heavy crop of potatoes being lifted by means of a mechanical digger.**

**Fig. 3.—A potato paddock after digging and picking operations are completed. Note that the full sacks are covered with old bags and not haulms, thus reducing the chances of infection with the potato-moth.**

### Grading.

Grading is another operation in which care is required if loss is to be avoided. In the case of hand sorting it is only a question of removing tubers that have been damaged in the digging process. The mechanical grader, because of its construction, is likely to damage the tubers unless care is taken in its operation. The tubers pass over riddles made of corrugated wire, and these will skin the tubers if the grader is driven too fast or is allowed to block through being operated without enough cant to aid the tubers over the riddles.

The operator of the grader needs to be quick of eye and hand to ensure that all damaged tubers are removed. Riddles have now been constructed with a rubber coating over the wire riddles, and these are proving very satisfactory.

If the foregoing points are kept in mind when the potato crop is being planted and lifted there is no doubt that growers will find their losses reduced to a minimum.

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# Samuel Marsden.

## Father of New Zealand Agriculture.

W. S. Rollings.

THURSDAY, 12th May, marked the centenary of the death of Samuel Marsden. For more than forty years he was His Majesty's Chaplain in the Colony of New South Wales. Through good and evil report he fulfilled the duties of this office with fidelity and praiseworthy zeal. He was the outstanding moral personality and champion of righteousness in the first four decades of Australian history. He also introduced Christianity to the Maori race, and is honoured as the Apostle of New Zealand.

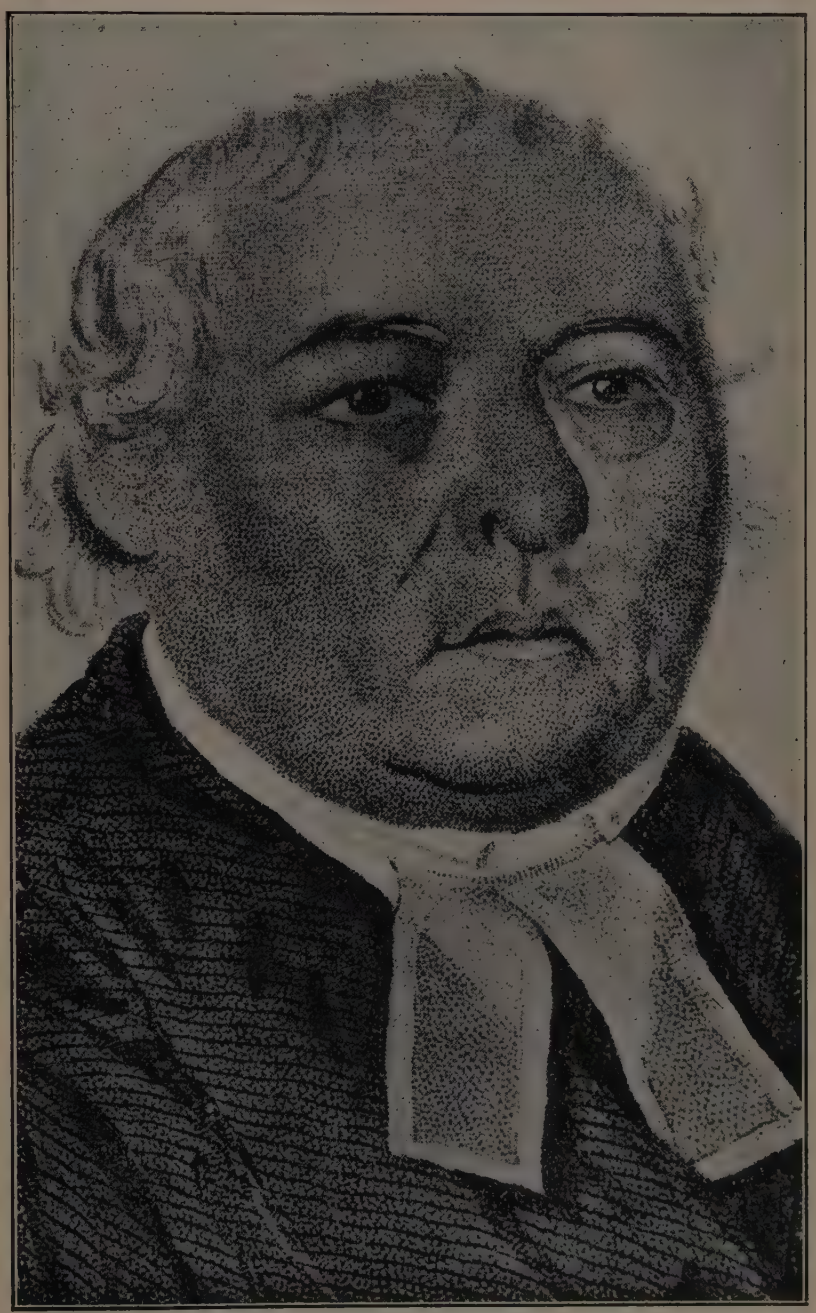
But Marsden was no mere ecclesiastic or theological pedant; he was the first to envisage and proclaim the destiny of Australia as a land whose resources made possible the building up of a new and great nation. More than that, in his practical achievements he led the way, and moved the British Government to take steps towards the fulfilment of a programme of national development.

### The Farmer.

Marsden was born of sturdy Yorkshire stock in the village of Farsley, near Leeds, on 28th July, 1764. His father, who cultivated a small farm and also ran a smithy, lived to be ninety-three years of age. After a few years at a village school Samuel spent the years of his youth up to the age of twenty working on the farm and at the forge. He there developed the splendid physique which in after life showed extraordinary powers of endurance, and gained a practical knowledge of farming and the elements of manufacture.

At the age of twenty he became a pupil of the Hull Grammar School under Joseph Milner, famous as a teacher and historian. From Hull he was sent to Magdalen College, Cambridge, to prepare for a career in the ministry of the Anglican Church. In 1793, at the instance of William Wilberforce, he was appointed by Pitt, the Prime minister, as assistant Chaplain to the convict settlement of Botany Bay.

On the eve of leaving England Marsden was married to Elizabeth Tristam, a grand-niece of Sir Clowdisley Shovell, the famous Admiral who, with Admiral Sir George Rooke, conquered the Rock of Gibraltar for England. Mrs. Marsden was a woman of practical mind and fine



**Samuel Marsden at an old age.**

business capacity, and greatly assisted her husband in his farming and business adventures.

The young couple arrived at Port Jackson in March, 1794. Marsden found the economic situation precarious. The settlement was dependent on stores sent in His Majesty's ships from England or from India. To help relieve the situation the Governor made grants of land to the officers of the Government, and Marsden, with his colleague the Rev. Richard Johnson, accepted a grant and became a farmer.

### "No Disgrace to Labour."

Marsden justified his action both on the grounds of necessity and good example. It was a case of either "plant and sow, or starve." "It was not from inclination," he wrote, "that my colleague and I took the axe, the spade, and the hoe. We could not, from our situation, help ourselves by any other means, and we thought it no disgrace to labour."

Marsden's energy and skill as a pioneer farmer were rewarded with success. In 1801 he farmed 326 acres, one-third of which he had purchased. He had cleared 126 acres of heavy bush and planted 108 acres in wheat. He had also added stock-breeding to agriculture, and when the nineteenth century broke he was the owner of 5 horses, 15 head of cattle, and 340 sheep. His flock was then the third largest in the colony. Governor King, in writing to Sir Joseph Banks at this period, described Marsden as "the best practical farmer in the country."

Sir Joseph Banks had accompanied Captain Cook on his voyages. Banks Peninsula is named after him, and it was Banks who gave Botany Bay its name. He became the president for many successive years of the Royal Society. It was on his advice that the British Government passed the Act to form a British settlement at Botany Bay, which marked the beginning of Britain's south sea possessions.

### True Friend of the Colony.

Sir Joseph was an eminent botanist, but not a scientific pedant. He was a true friend of the young Colony of New South Wales, and did all in his power to advance its welfare. He shared Marsden's vision of Australia becoming a great agricultural and pastoral nation. Sir Joseph came to regard Marsden as the key man in the colony on agricultural, horticultural, and pastoral development. He took pains to send Marsden seeds of various kinds, and selected fruit-trees.

Marsden, on his part, made the fullest use of this stewardship. His farm became an experimental nursery, and the products of his orchard became famous throughout the settlement.

After a decade the colony became self-sufficient as regards wheat-production. Then for a time farming showed a decline. Marsden was appointed on a Commission to inquire into the cause. His report was to the effect that the officers of the New South Wales Corps had established a practical monopoly of trade, buying between them the cargoes of ships trading with Port Jackson, including spirituous liquors, and retailing the same at enormous profit.

Thus, the settlers were impoverished and the personnel of the community lowered through the excessive use of alcohol. Marsden incurred the enmity of the military party by his exposure. But he earned the gratitude of the civil population for his fearless and disinterested service.

### Presented with Address.

In 1807, on the eve of his one furlough to England, he was presented with an address signed by Arundel, the surgeon, and 265 men on the land. This bore testimony to his exemplary character, fidelity, and disinterested services as a minister of religion, Magistrate, inspector of orphanages and schools, &c., and added:—

"We also thank you for your attention and care to the improvement of stock, agriculture, and all other beneficial and useful acts for the general good of the colony, and benefit to civil society in this remote part of the globe."

Marsden's holding in land increased to upwards of 2,000 acres. This he farmed by means of convict labour. For his services as Magistrate and Superintendent of Public Works he was entitled to the services of a dozen convicts, and he often employed a score of others. He proved an excellent manager. All his adventures prospered, and he became a man of substance.

### The Shepherd.

Marsden shares with others (notably John Macarthur) the honour of pioneering Australia's leading industry of sheep-breeding. Macarthur's flocks were more numerous, but Marsden was the more painstaking and scientific breeder. It was Marsden who first proclaimed the destiny of Australia to become the greatest country in the world for the production of the finest-grade wool.

He early put on record his judgment that "the climate and the soil of the country were calculated to bring the breeding of sheep, whether for food or wool, to the highest perfection." The weight of his opinion, backed by his practical experiments, greatly encouraged the enterprise.

In 1802, in a letter to Sir Joseph Banks, he discusses sheep-breeding in the colony. The letter mentions that among the flocks were Spanish, Southdown, and Tees Water breeds. He desired to introduce Leicester and Lincoln strains, and instructed his agent to procure and send him two such rams from England.

### His Aim as a Breeder.

At this time the flocks of the colony were a promiscuous lot. Marsden wrote: "Not more than a tenth part of the flocks has any pretence to be called fine woolly sheep." He also states his aim as a breeder: "To unite as much as possible beauty of make, strength of constitution, weight of carcase, and goodness of fleece."

His methods to achieve this end were thorough-going and scientific. He selected his breeding-stock with great care. He carefully tabulated the results of his experiments, which he published for the benefit of the community.

As early as 1800 he discovered that the pastures where trees prevented the sun drying grass after rains and heavy dews weakened the constitution and increased the mortality of his flock, but that when the sheep were pastured on fallow ground after the removal of crops they rapidly improved.

Marsden proved by his eight years' experience that farmers who pastured their flocks in open country with common care could reckon on an annual loss of not more than 2 per cent.

### The Golden Fleece.

Marsden's achievements in the breeding of Merino sheep were noteworthy and pointed the way to the evolution of the world's champion wool-producing animal. He had made a practice of purchasing a few sheep from various ships trading with Port Jackson. These were of a hairy variety, and came mostly from India and the Cape. But on one occasion he was fortunate in securing a pair of Spanish Merino sheep—a ram and a ewe. That was in 1798.

Six years later he submitted to the Governor of the Colony eight samples from his fleeces to illustrate the results of his methods of breeding. He put the Merino ram to the hairy ewes. The first result was a wonderful improvement in the fleece, but the sheep produced were not so large or healthy. He made the inference that Merino sheep were of more delicate constitution than the coarse-wool variety.

In 1800 he had "a very fine male lamb from a Spanish ram and a coarse-wool ewe." The first year his fleece weighed 3 lb., the second 4 lb. 12 oz., and the third 6 lb.

### Report on Breeding.

Marsden in his report to the Government added: "The produce of this male are very fine sheep with good wool. The real Spanish sheep, as far as my own observation has gone, are not so hardy in their constitution or weighty in their carcase." But he ventured the opinion that when acclimatized, and with careful in-breeding, each successive generation would show an increase in the weight of their fleece and the fineness of their wool.

In 1805 Marsden and John Macarthur were associated by the Government with an English wool expert named Wood in making a report on the wool industry. Wood's report was based on specimens of Macarthur's and Marsden's flocks. The conclusion this English expert reached was that—

"With due care and attention to propagation from the pure race of Spanish sheep, until sufficient numbers of them can be raised, or from the nearest kind to them can be procured, the whole of the wool would, in a very few years, become equal in quality to the very best that is obtained from Spain."

### The Wool Trade.

To Marsden belongs the honour of pioneering the chief industry of Australia, its wool export. The Continent has become a noted wheat and gold producing country, but the value of its wool far exceeds that of its gold and wheat yield together.

When Marsden returned to England on a visit in 1807 he took with him some bags of wool selected from his own fleeces. This was made into cloth by a Leeds manufacturer, and was pronounced to be equal to the finest production of French looms. This demonstration of the value of the Australian product had noteworthy results for the colonial industry.

Spain had striven to make the production of Merino wool a national monopoly. It was a criminal offence to export a Merino sheep from the country. But the King was above the law, and his Spanish Majesty had presented to George III a few of the choicest specimens of Spanish Merinos. Through the good offices of Sir Joseph Banks the King became interested in Marsden's venture.

### Spanish Ewes for Colony.

One report says that a coat was made for His Majesty from the cloth manufactured from Marsden's wool. Be this as it may, the King, through Sir Joseph Banks, presented to the colony five ewes from the Royal stud. Sir Joseph felt it important that these valuable animals should be shipped to Sydney under the personal care of Marsden, and journeyed post haste to Portsmouth just in time to place them aboard the ship "Ann" in which Marsden returned to Australia. Four of these safely reached their destination with two lambs.

The Australian stud Merino sheep of to-day is a vastly superior animal to that of one hundred and thirty years ago. The animals brought by Marsden from the Royal stud had little wool on their bellies and their legs were bare of fleece. To-day, through a development of Marsden's system of breeding, every part of the Merino ewe is covered with wool of the finest quality, while stud Merino rams are bred in oversized skins, whose convolutions are thickly coated, with only eyes and hoofs bare of fleece. Some of these super-animals have fetched as much as three thousand guineas.

### Marsden and New Zealand.

Marsden had long planned to inaugurate a mission to the Maori race. For several years he had made contact with Maoris visiting Sydney. He extended to Maori chiefs the unbounded hospitality of his home in Parramatta. One of these was Ruatara, whom he afterwards befriended when, abandoned, lonely, and ill, Ruatara was a passenger in the forecastle of the ship "Ann" by which Marsden returned from England.

On arrival in Sydney, Ruatara became Marsden's guest until he joined a ship sailing for New Zealand. While in London Marsden had prevailed on the Board of the Church Missionary Society to undertake responsibility for this Mission. Marsden planned the Mission on industrial and agrarian lines.

### Mission Planned.

The first agents engaged—Hall and King—were not clergymen, but tradesmen. He believed that agriculture and stock-raising would divert into productive channels the fierce energy of Maori chiefs which expressed itself in destructive tribal wars. "No nation," he declared, "can be built up without commerce and the arts of civilization."

### The First New Zealand Farmer.

A year or two before his crossing of the Tasman, Marsden had sent a supply of seed wheat to Ruatara. The latter had seen wheat growing in New South Wales, and had become familiar also with the process of flour-milling when in Sydney.

This wheat was duly sown on part of Ruatara's tribal land at the Bay of Islands. The venture excited the curiosity of the Maoris. They were incredulous at first when told that ship's biscuit, which they esteemed as a luxury, was made from wheat. Then they thought it must be a kind of tuber, like the potato or kumara, and out of curiosity pulled up some plants to see what grew out of sight. When told the flour came not from the roots but from the seed, they scorned the idea.

Ruatara, however, reaped a splendid first crop. Then came his problem. He had no means of milling the wheat, and the primitive method of grinding it between stones did not occur to him. He appealed to Marsden by letter for help, and the "Active," on her first crossing of the Tasman, brought to Ruatara the gift from Marsden of a steel hand-mill.

Ruatara welcomed the gift with delight. It was installed in his granary without delay, and the unbelieving Maoris were convinced that bread and biscuit were made from wheat when they saw the stream of flour pour from Ruatara's mill.

Ruatara was impatient to make a wheaten cake. So the wheat was kneaded into dough, and the first New Zealand bread made of New-Zealand-grown wheat was baked in a frying-pan!

Thus, while Ruatara raised the first wheat crop, Marsden's New South Wales farm supplied the seed, and the mill which ground the first corn was the gift of the missionary to the Maori chief.

In 1814 Marsden purchased at his own cost the brig "Active" of 110 tons for £1,400. Her first trip to the Bay of Islands was via Tasmania under the famous Irish seaman, Captain Dillon. This was by way of experiment.

The chiefs proved friendly, and eight—including the famous Hongi, Ruatara (his nephew), Koro Koro, and Tuhi—returned on her to Sydney and became Marsden's guests. These were also kindly treated by Governor Macquarrie, who gave them each before returning the doubtful gift of a military uniform. A more useful present was that of a bull and two cows from the Government herd.

### A Modern Noah's Ark.

Marsden, with Captain Hansen in command, left Sydney in November, 1814, in his brig for the Bay of Islands. In the cabin were eight Maori chiefs, three missionaries—Hall, King, and Kendall—with their wives and five children. Several smiths and sawyers were also on board.

The ship's hold was a miniature Noah's Ark. It carried one bull and two cows, one horse and two mares, a number of sheep and fowls. There was also a good supply of fruit-trees of various kinds,

and seeds. After a voyage of twenty-one days the brig reached the Bay of Islands.

Marsden had previously sent wheat to Ruatara and a steel hand-mill. This doughty missionary, therefore, became in the Dominion the pioneer of agriculture, of horticulture, of horse-breeding, of the fruit, dairying, and poultry industries, and also of manufacture.

The Maoris were astonished at the stock landed from the "Active." They had never seen four-footed animals larger than a pig. When Marsden mounted the horse and rode up and down the beach their delight knew no bounds.

The "Active" in subsequent voyages brought further supplies of stock, seeds, and fruit-trees across the Tasman, and Marsden also sent large supplies of spades, hoes, and axes. But he was adamant that no guns, powder, or rum should be carried, and that no weapon of war should be made or repaired at the Mission smithy.

The "Active" in subsequent voyages brought additional stock from Marsden's flocks and herds in New South Wales. Nine years after the inauguration of the mission, Marsden estimated that there were upwards of fifty cattle on the New Zealand mission stations which belonged to him. His detractors in New South Wales spread the report that he had large personal holdings and flocks in New Zealand.

Marsden never owned a foot of land in the Dominion. He generously presented all his stock in New Zealand to the Church Missionary Society "for the comfort and support of their missionaries." When it is remembered that the price then current of a cow was £8o, it will be seen that this was a noble contribution. But Marsden's disinterested generosity knew no bounds.

### Industries Flourished.

The primary industries thus inaugurated flourished amazingly. In less than a generation some of the Maori chiefs became possessors of dairy herds and were successful agriculturists.

In 1835 the famous naturalist, Charles Darwin, visited the Bay of Islands in H.M.S. "Beagle." He wrote with enthusiasm of what he saw at Waimate:—

"On an adjoining slope, fine crops of wheat and barley were standing in full ear; and in another part fields of potatoes and clover. But I cannot attempt to describe all I saw. There were large gardens with every fruit and vegetable which England produces, and many belonging to a warmer clime. I may instance asparagus, kidney beans, cucumbers, rhubarb, apples, pears, figs, peaches, apricots, grapes, olives, gooseberries, currants, hops, gorse for fences, and English oats, and many kinds of flowers."

Marsden's supreme aim was spiritual, but in his judgment material things and daily occupations belonged to the Kingdom of God. He made seven voyages to New Zealand, and by his disinterested toils and sacrifices for everything that made for the welfare of the Maori race became their most trusted and revered friend, and still to-day, a century after his death, Samuel Marsden is enthroned in the affection and memory of the Maori people.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# Foot-rot in Sheep.

## Precautionary Measures Necessary.

H. DOYLE, M.R.C.V.S., Veterinarian, Dunedin.

AT this period of the year foot-rot is one of the most troublesome and widespread diseases affecting sheep, especially those on wet, marshy land. On the dry, harder country the horn of the feet is naturally worn down and the hooves are not allowed to become overgrown, as is the case where the pastures are soft and damp.

Foot-rot may be divided into two types—(1) contagious, (2) non-contagious. As both these conditions have, from a practical viewpoint, more or less the same predisposing causes and symptoms and treatment, difficulty will be experienced by the farmer in differentiating between contagious and non-contagious. Therefore it is intended in this article to consider all cases as of the contagious type.

Wet seasons and damp, low-lying pastures have a detrimental effect on the feet of the sheep which are kept for any length of time on them. The horn-structure of the hoof becomes weakened by the excessive moisture, and heavy dews on pasture may have a similar effect in causing softening and even decay of the horn.

### Common Causes.

Most farmers are aware that one of the most common predisposing causes of foot-rot in sheep is injury or abrasion of the tissues in the space between the claws, producing the condition known as "scald." This may be brought about by the irritation produced by long, rank pastures, and under muddy conditions grit and dirt may become lodged in the interdigital space and so produce small wounds in this area. "Scald" is usually regarded as the precursor of foot-rot.

In areas where irrigation of pastures has been introduced the condition of foot-rot has become much more prevalent than was formerly experienced.

In cases where the hooves of sheep are allowed to become overgrown, with the formation of long toes, an uneven treading surface is produced and the pressure is unevenly distributed on the ground surface. This, as can be realized, encourages the formation of cracks and separations between the wall of the hoof and the sole, allowing the entrance of dirt contaminated with bacteria.

### Effect of Seasonal Conditions.

Seasonal conditions, such as rainfall with a strong growth on pastures, must have an important bearing on the incidence of the disease. Merinos and half-bred sheep seem to be more susceptible to foot-rot than the British breeds of sheep, and Romneys are generally considered to be less susceptible than the average breed.

The above-mentioned conditions all tend to bring about a state of affairs in the foot which may result in the non-contagious type of foot-rot, but if the pastures on which the sheep are grazing are contaminated by the organisms responsible for the contagious type the weakened state of the feet renders the sheep very susceptible to infection by these organisms, and so the contagious variety is set up.

It is true that foot-rot is a specific contagious disease, and that before new cases can develop under natural conditions material from foot-rot cases must come in contact with the feet of the sheep. Considering this point, it will readily be appreciated that in flocks where some sheep are affected the pastures become temporarily contaminated, and that mud through which affected sheep have been moved is a ready source of infection. Soft, wet conditions such as sometimes exist around gateways or dirty yards are means by which sheep may develop foot-rot.

### Cause.

While the organism *Fusiformis necrophorous*, which is responsible for the death of tissue, is generally associated with foot-rot in sheep and was widely held to be either alone or in conjunction with other organisms the cause of the disease, recent research by Beveridge in Australia will probably show that the causal agent is a different organism, which he at present has named "K."

It is thought that the organism *Spirochaeta penortha* is perhaps also necessary for the development of the typical disease. *F. necrophorous* may also play a part; it is perhaps a secondary invader commonly present in the environments.

Although the incidence of foot-rot varies with the seasonal conditions—that

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is, fresh cases developing mostly in spring and autumn, when there is a flush of feed, and few new cases developing during summer—nevertheless fresh cases can develop only where infection is present.

The question which the farmer will naturally ask is, " When the disease has apparently died down during a dry season, where does the infection come from to start a fresh outbreak? Does it survive in the soil or on pastures and become active when conditions are favourable? "

Recent research would indicate that the organism in material from foot-rot cases does not survive for more than about three weeks in mud, &c., but in the lesions of chronically infected sheep it may survive for at least three years and a half. From this it will be seen that the most likely place for the organism to survive from one outbreak to another is in the lesions of chronic cases, and cases of this kind become a source of infection for other sheep when favourable conditions again exist.

### Symptoms.

It is hardly necessary to go into detail with regard to the symptoms, as the sheep-farmer has become quite familiar with them through experience.

Probably the first symptom shown will be lameness, the degree varying with the stage of the disease. In the early stages slight lameness will be seen while in advanced cases the lameness will be more marked.

Where only the fore feet are badly affected the sheep will sometimes be seen on its knees while grazing; when all four feet are grossly affected the animal is not inclined to move about and lies in one place and grazes around it. Due to lack of wear, the hoof becomes overgrown and distorted.

The affected sheep rapidly lose flesh and become very weak in cases where the pain is great. All the different stages may be seen in one flock, from slight cases to advanced cases where the sheep cannot move about.

### Presence of Lesions.

Examination of the foot in the early stages shows inflammation, denoted by redness and swelling, in the space between the claws. The area appears moist and gives off an evil-smelling odour, while ulceration of the skin is often present.

Once established the disease extends rapidly, under-running the horn of the hoof and affecting the deeper structures of the foot. If a little pressure be brought to bear on the inside of the foot a slight dirty, evil-smelling discharge will be seen oozing from the edges of the horn.

Ligaments, tendons, or even bones of the foot may become involved. As the condition becomes chronic the hoof becomes detached from the underlying tissues in places, and in some cases the hoof may be shed.

### Steps for Control.

If the sheep-farmer fully appreciates the contagious nature of this disease and takes proper steps in attempting to

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eradicate it from the flock, preventing as far as possible fresh infection, he will be amply repaid for his trouble.

As was previously mentioned in this article, it has been shown experimentally that the causal agent of foot-rot cannot survive apart from the sheep for more than a few weeks. This information should prove extremely useful in forming a scheme of control.

Assuming that the organisms responsible for the disease will lose their infective powers if not in contact with sheep for a few weeks, pastures which are kept without sheep for one month can reasonably be taken as free from infection.

In attempting to minimize the incidence of foot-rot on a property the whole flock should be subjected to a thorough examination, and each sheep, whether showing symptoms of foot-rot or not, should be included in this examination.

### "Hospital" Paddocks.

Certain paddocks should be set aside as "hospital" paddocks, and every sheep which on examination shows any sign of foot-rot, whether it be in the very early stages or in the advanced stages, should be kept isolated in these "hospital" paddocks.

The apparently clean sheep—that is, those which show no external evidence of the disease—should be put through a foot-bath containing a solution of copper sulphate (bluestone) of the strength mentioned later. It is only after this precaution has been taken that these sheep should be put on to the pastures which have been spelled from sheep and are therefore regarded as clean pastures.

The remainder of the flock—those sheep which are showing lesions of foot-rot in any stage—should be kept in the "hospital" paddocks, and, after a thorough paring of the feet, treated either individually or by means of the foot-bath, depending on the numbers affected and the extent of the lesions. Badly affected sheep should be hand-dressed.

### Proper Preparation.

The fact that the feet of badly affected sheep must be properly prepared before any dressing will have a beneficial effect cannot be too strongly emphasized. All diseased or loose horn must be carefully but thoroughly removed in order to provide drainage and also to expose the affected sensitive structures to the action of the dressing. Remember that the causal organisms develop best under crusts and dead tissue in the absence of air.

After the sheep have apparently recovered it will be good practice to keep them for a month before putting them on to the clean pastures with the sheep free from foot-rot. This precautionary measure is taken as sheep which have apparently recovered may carry infection, but if they continue without showing lesions for a month they are apparently free from infection.

If this control measure is carried out the incidence of foot-rot should be reduced, if not eliminated from a flock. The fact that fresh infection may be carried mechanically from infested pastures to clean pastures by means of horses' feet or on the boots of workers must not be overlooked, but the chance of this happening is very remote.

Having reduced the incidence of the disease in a flock, care must be taken to isolate any new sheep and to treat any affected animals before they are introduced into the flock.

### Methods of Treatment.

On properties where foot-rot is prevalent the sheep-farmer is well advised to examine the feet of the sheep periodically, to trim off any overgrown horn, and to put the sheep through the foot-bath. Thorough trimming of the feet is absolutely essential in badly affected animals. The dead tissue does not necessarily become detached of its own accord, so that this must be removed to allow any dressing to have effect. All under-run horn should be stripped. During the examination all misshapen hooves require paring to discover any possible hidden focci of infection.

Cases in the early stages may be treated by means of a foot-bath. The bath may be made of either wood or concrete, about 16 ft. long, 10 in. wide, and 7 in. high at the sides, and 3 in. at the ends. Side fences are provided, close-boarded and sloping outwards, to permit the sheep walking through. A thin layer of wool may be laid on the floor of the trough to prevent splashing.

Various preparations have from time to time been used in the foot-bath, but probably copper sulphate (bluestone) or formalin solution gives as good results as any.

### Solution of Bluestone.

The bluestone for use in the bath should be of 10-per-cent. solution when used as a safeguard against foot-rot, and 20 per cent. in treatment (20 per cent. equals 1¾ lb. of bluestone to 1 gallon of water).

The sheep should be put through the bluestone bath at least once a month, and should be held in the foot-bath for three to five minutes. There is no necessity to put more solution into the bath than will be sufficient to cover the feet of the sheep.

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Formalin solution has given good results both as a foot-bath and also for individual dressing. For use in the bath a solution of 1 part of formalin to 15 parts of water should be prepared, the sheep being kept in the solution for ten minutes and then held on the battens until quite dry.

**Hand-dressing Certain Cases.**

In hand-dressing individual cases after careful and thorough paring of the feet, a solution of 1 part of formalin to 3 parts of water is applied, and the sheep should be kept on the battens until quite dry. It is a good practice in dealing with these advanced cases which are being hand-dressed to keep them for several days on the battens, providing them with dry feed. This allows the feet to be kept dry and gives the dressing a more prolonged action. Hand-dressing should be carried out daily.

Arsenical preparations are sometimes used in the treatment of foot-rot, but it is questionable whether the treatment is any more beneficial than bluestone or formalin, which are comparatively safe and easy to use. Arsenic is poisonous, and every precaution should be taken to guard against the possibility of ingestion of the arsenic by stock.

Where a poisonous bath such as arsenic is used it is necessary to provide a yard for drying in order to prevent deaths from the consumption of pastures contaminated with the poison. Various proprietary preparations for the treatment of foot-rot are on the market, and, if properly used according to instructions, will no doubt give satisfactory results.

**Use of Ointments.**

In advanced cases it will be necessary to hand-dress. Ointments are useful in hand-dressing badly affected cases because of their prolonged action. A useful dressing may be made up as follows: Over a slow fire, mix one part of powdered bluestone, one part of lard, and two parts of stockholm tar.

It is important that the foot should be thoroughly dry before the ointment is applied. The number of applications will vary with the intensity of the lesions; bad cases should be dressed two or three times a week.

Butter of antimony is sometimes used in hand-dressing foot-rot cases. As a general application it is much too caustic in its action, and should never be used as such. It is only useful for applications to areas of granulation tissue or proud flesh, and then its application must be controlled by applying it with a feather or a very small brush.


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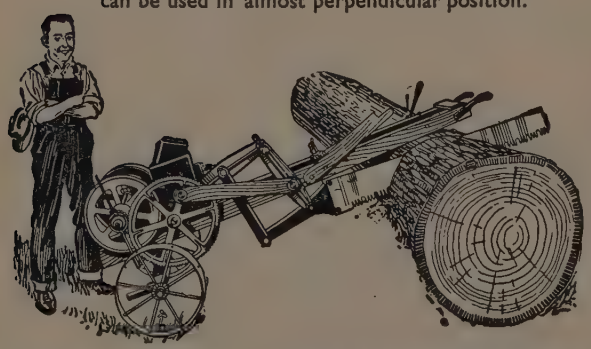

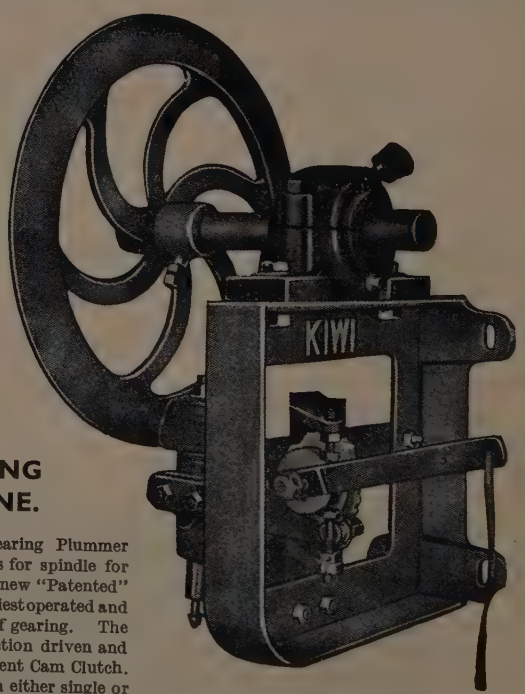


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# Reclaiming Fences from Silt.

## Ingenious Device Used in Esk Valley.

R. P. HILL, Fields Instructor, Hastings.

FENCING was one of the first problems to be tackled after the grass-seed had been sown on those farms which had been completely silted up in the Esk Valley. Practically every fence was covered by silt almost to the top of the posts, and in many instances the posts were completely covered and out of sight.

A start was made to dig the posts and wire out. At first the job appeared simple enough, but very soon it was found to be anything but simple, for all posts and wire below ground-level were tightly wound round with masses of debris brought down by the flood-waters. Under these circumstances digging out was slow and quite uneconomic. Other methods of raising posts were explored, and the result was that a motor-truck was brought into use.

This truck—a built-up combination of the parts of several trucks—contained an old engine with two gears. One gear drove the truck, and the other the ingenious owner had converted into a winding-gear, which fitted on to a differential,

Fig. 1.—The motor-truck and gear about to pull a fence-post from the silt.

Fig. 2.—A close-up view of the dragging-wire hitched to the top of the embedded post.

Fig. 3.—The post uprooted from the silt.

then on to a chain-drive to a double-cog wheel, which drove a winding-drum. The drum was situated on the decking of the truck immediately behind the cab.

The rear decking had been hinged so that it could be lifted up to any required angle to act as a derrick, and on the extreme back there was a pulley-wheel, strongly stayed and braced. A $\frac{5}{8}$ in. steel-wire rope was attached to the drum and from there brought up and over the pulley, and this completed the winding-gear.

By this means posts were pulled with the greatest of ease and in a minimum of time. The truck is driven into a position where a direct upright pull may be obtained from the top of the post, the wire rope is pulled down and secured to the top of the post by means of a half-hitch, the gear let into the winding mechanism, and up comes the post. There is plenty of power; in fact, when a $\frac{1}{2}$ in. rope was used the strain was sufficient to break it, and it was found necessary to use the $\frac{5}{8}$ in. wire rope.

Completely buried posts in a seven-wire fence were pulled in this manner, and when the posts were brought above ground it was found that all the staples had either broken or been pulled. Footed posts were also pulled. In one case a post was so firmly footed that, although the strain was straight up and down, the post—a sound totara—snapped off like a carrot. This mechanism is capable of pulling anything from twelve to twenty posts per hour.

As the silted ground is reasonably level there is no delay in moving from post to post, and once a fence-line is located the truck may be driven from end to end. With this appliance the cost of raising each post will be approximately 6d. The cost of new posts will be anything from 3s. to 4s. per post.

It was not found possible to salvage fencing-wire in the same manner, as the strain of dragging out the wire was so great that the wire was either stretched or broken.

# Seed-wheat Certification.

FIELDS DIVISION.

FOLLOWING is a list of growers whose wheat crops have passed both the field and the grain inspections required under the Government scheme for the certification of seed-wheat. The seed from these crops is not recognized as finally certified until it has been satisfactorily machine-dressed and the sacks suitably tagged and sealed. A previous list appeared in the March *Journal*:—

| Grower. | Acreage. |
|---|---|
| **Cross 7.** | |
| Bowie, J. H., Otaio | 10 |
| Brown, H., Seaview, Ashburton | 16 |
| Brown, I. G., Grovetown, Blenheim | 8 |
| Canterbury Agricultural College, Lincoln (Line A) | 5 |
| Canterbury Agricultural College, Lincoln (Line B) | 18 |
| Crampton, T. B., Fairlie | 34 |
| Dixon, W., Tinwald, Ashburton | 5 |
| Gardiner Bros., Waitohi, Temuka | 35 |
| Honeywood, M. B., Castlerock R.D., Lumsden | 18 |
| King, W. H., Rosewill, Timaru (Line A) | 25 |
| McCarthy, T., Pukeawa R.D., Balclutha | 9 |
| McCaw, W. T., Tycho R.M.D., Timaru (Line A) | 17 |
| Maindonald, C. E., Fairlie | 8 |
| Manchester, J., Waimate | 35 |
| Marshall, W. S., Winchmore, R.D., Ashburton | 28 |
| Talbot, F. and R., Rangitira Valley, Temuka | 25 |
| Talbot, P. R., Claremont, Timaru (Line B) | 12 |
| Talbot, W. H., Pleasant Point | 7 |
| Tutton, F. A., Springston R.M.D. | 17 |
| Wallace, D. W., Makikihi | 20 |
| Walsh, G., Levels (Line A) | 15 |
| Walsh, G., Levels (Line B) | 10 |
| Woolley, H. G., Spring Creek, Blenheim | 9 |
| **Dreadnought.** | |
| Cooper, W., Kakanui | 20 |
| Corrigan, J., Waimate (Line B) | 15 |
| Forsyth, J., Willowbridge | 12 |
| Kerrin, J. M., Enfield R.D. | 7 |
| Saunders, F. L., Studholme Junction | 4 |
| **Hunters II.** | |
| Beck, W., Five Forks | 10 |
| Belcher, R. H., Lincoln | 20 |
| Campbell, R. and P., Kingsdown, Timaru | 20 |
| Canterbury Agricultural College, Lincoln (Lines A and B) | 31 |
| Johnston, D., Tai Tapu | 17 |
| King, W. H., Rosewill, Timaru | 4 |
| Kinnimont, J., Five Forks R.M.D. | 5 |
| Mackie, W. A., Temuka Post-office | 10 |
| Morris, W. H., Orari Bridge, Geraldine | 23 |
| Nicholas, L. G., Hook R.M.D., Waimate | 24 |
| Petrie, D. R., Waikuku R.M.D., Rangiora | 12 |
| **Hunters II**—*continued.* | |
| Robinson, R. P., Waikuku R.M.D. | 17 |
| Skinner, J. L., North Taieri | 9 |
| Tiffen, W. A. E., Makikihi | 9 |
| Toohey, W., St. Andrews (Line A) | 36 |
| Toohey, W., St. Andrews (Line B) | 5 |
| Wallace, D. W., Makikihi | 22 |
| **Jumbuck.** | |
| Brougham, J. F., Box 53, Blenheim | 6 |
| Canterbury Agricultural College, Lincoln | 16 |
| Christie, A. J., Toiro, South Otago | 4 |
| Cleland, W. A., Springston R.M.D. | 4 |
| Douglas, J., Middle Road, Blenheim | 20 |
| Gunn, A., Marathon Estate, Seddon | 14 |
| Marfell, H. R., Seddon | 4 |
| Norman, F. J., Springlands, Blenheim | 6 |
| Orr, J., Pleasant Point | 10 |
| Snowden, K. R., Dillons Point Road, Blenheim | 14 |
| Stuart, A., Marton (Lines A and B) | 107 |
| Tippet, T. H., Mid Lincoln Road, Halswell | $6\frac{1}{2}$ |
| Webster, A. N., Seddon | 14 |
| Weir, J. F., Thornbury, Southland | 3 |
| **Sensation.** | |
| Steven, G. H. M., Rosewill, Timaru | $1\frac{1}{2}$ |
| **Solid-straw Tuscan.** | |
| Canterbury Agricultural College, Lincoln | 25 |
| Carr, J., Mt. Hutt R.D., Rakaia (Line A) | 23 |
| Carr, J., Mt. Hutt R.D., Rakaia (Line B) | 19 |
| Craythorne, L. C., Tycho R.D., Timaru | 12 |
| Early, C., Templeton | 13 |
| Gray Bros., Greendale | 50 |
| Harvey, B., Southbridge | 9 |
| Kibblewhite, L. L., Templeton | 17 |
| Lee, H P., Cricklewood R.M.D. (Lines A and B) | 20 |
| Limbrick, R. E., Mt. Hutt R.D., Rakaia | 19 |
| Lyon, C. R., Temuka | 5 |
| Morrison, J. L., Morven | 30 |
| Page, A. E., Cheviot | 13 |
| Pascoe, J., Kirwee | 50 |
| Quigley, A., Otipua P.O. (Line A) | 19 |
| Skinner, J. L., North Taieri | 5 |
| Talbot, F. and R., Rangitira Valley, Temuka | 21 |

# Liming in South Island.

## Position in the Various Pastoral Districts.

## Marlborough District.

IT is apparent, from figures published recently showing the amounts of lime applied in the various provinces last season, that Marlborough is sadly behind. The total occupied area is 2,428,682 acres, and of this only 939 acres was top-dressed last season with lime alone. This is rather an anomaly in a district where there is an abundance of workable limestone outcrops.

In many parts of the province there is ample evidence of a distinct lack of lime, and this is borne out by tests, which have shown a deficiency of up to 4 tons an acre. The Wairau Valley shows this lime-deficicncy both in the stock and pastures, and stock showing malformations intimately connected with a deficiency in lime have come off land in this area. It is noticeable that when these same stock are moved to an area showing a higher calcium content the malformations are corrected. Rai Valley also has land deficient in lime, while parts of the Sounds area and the Omaka Valley also show a large deficiency.

### Deterioration of Soil.

Many of these areas have been cropped extensively in the past without any attempt at replacement of manures, and the accumulation of acidity and the general deterioration of the soil are problems with which many farmers in the district are confronted.

Response to the application of lime is perhaps the most satisfactory way of ascertaining the need for its use, and this has been borne out in the Department's experiments and on a larger scale on farms. Instances of excellent responses from lime applied are scattered throughout the province.

It is evident that from the application of lime in conjunction with fertilizer large increases in production are available, and it is also equally apparent that in many cases this must be applied if deterioration of pastures and stock is to be arrested.

The farmers, generally speaking, realize that the responses to lime which are to be seen in many parts of the district could be duplicated on their own farms, but the problem of how to obtain the lime in quantity at a cost comparable with that in other districts has long been a difficult one. A certain amount of lime comes from the Nelson works, but the cost of cartage limits this procedure, and the bulk of the demand has to be served by a single small works with only a small output. The price ex these works is 22s. 6d. a ton and is apparently considered by farmers as rather too high for large consumption. These works, by no means, covers the requirements of the whole province, and cases of farmers' orders not being filled are reported to be numerous.

### Company Starting.

The problem is so urgent that a move is on foot among the farmers themselves for the establishment of a company to quarry lime. However, in the light of recent events this may not be necessary, as it appears that a private company which has recently obtained a lease of one of the best deposits will commence operations on a large scale within the next six weeks. This will be undoubtedly a big step forward in agricultural action in Marlborough.

During the last eight months the Fields Division of the Department of Agriculture, realizing the urgency of the position, has conducted extensive research into the possibilities of the various deposits, and it appears that, taking into account the accessibility to rail and the quantity and quality of the lime available, that the deposit selected by the company previously mentioned is one of the most suitable.

The farming community will undoubtedly welcome the opening of the new works, and it is felt that with the increase in the amount of lime available many of the unproductive pastures to be seen in the district will be improved considerably.

*—D. R. Wilkie, Instructor in Agriculture, Blenheim.*


# Pulpy Kidney Vaccine

*(Entero-Toxaemia)*

● Orders for entero-toxaemia vaccine, made at the Commonwealth Serum Laboratories, Parkville, Victoria, are now being filled by the Veterinary Laboratory, Wallaceville, where stocks are held for New Zealand requirements.

● Farmers who are considering the vaccination of their ewes this season are requested to write at once for particulars and prices, if their order has not already been placed. Mention the number of ewes to be vaccinated, and also the date lambing will commence.

● Particulars are obtainable from any Inspector of Stock, the Department of Agriculture, or from the Officer-in-Charge, Veterinary Laboratory, Private Bag to Wallaceville, Wellington.

# Nelson District.

THE Nelson district is well endowed with limestone deposits, although in general the soils are acid and, with few exceptions, show marked responsiveness to lime. This condition —in which bases have been depleted from the surface soil, probably due to the progressive leaching over a long period by percolating rain-water—has led to the deposition in lower terrains of one or other of the several forms in which limestone naturally occurs.

The Takaka district is renowned for its deposits of marble, a relatively pure and crystallin form of limestone, rendered accessible probably as the result of later movements of the earth's crust. Elsewhere limestone rock of varying degrees of purity and hardness are available for crushing.

The stone used in present commercial workings is of good quality, while its fineness of grinding compares favourably with similar workings in other parts of New Zealand. Further, there are small crushing plants independently established by farmers who, by reason of their isolation or transport difficulties, prefer to crush their own stone to meet localized requirements.

### Spread of Weeds.

The spread of such weeds as spurry (yarr), sorrel, and moss, point to a wide-spread acid-soil condition and the desirability of liming. In addition, there are soils of the Moutere clay loam type showing unmistakably the physical effects of lime deficiency. Their texture, quality, drainage, and ease of working may be improved by dressings of lime. These soils require an initial application of 1 ton or more of limestone per acre, followed by annual dressings of at least 5 cwt.

Experience points to the necessity of liming the soils of Stoke, Waimea Plains, the Moutere Hills, the Moutere Valley, the Motueka Plains, the Dovedale and Stanley Brook Valleys, and Motupiko and Sherry Valleys. Soils which have a satisfactory lime status, and from which less benefit may be apparent from liming, are stated as the sandy silts of Riwaka and the Motueka Valley, the soils of Maori Pah and Cable Bay, and, to a lesser degree, the Maori sands and gravels of Waimea West, Motueka, and Riwaka.

In the case of pasture establishment on lime-deficient soils in Nelson, 1 ton of ground limestone per acre is generally a satisfactory dressing, except on soils of the Moutere clay loam type, where an even heavier initial dressing is desirable. This should be followed by annual dressing of not less than 5 cwt. per acre of carbonate of lime, together with 2 cwt. to 3 cwt. of superphosphate, which is necessary both initially and annually.

### Carbonate of Lime.

While limestone, after burning and slaking, is more speedy in its action than ground carbonate (15 cwt. of slaked lime being equivalent to 1 ton of carbonate), the general use of slaked lime is often less desirable for pasture purposes than carbonate of lime. Many soils in this area, apart from a natural lime-deficiency, have also a low organic status, and under pasture the initial flush of growth from the more readily available slaked-lime dressings rapidly depletes fertility, with the subsequent reversion to weedy, brown-top-dominant swards.

On the contrary, dressings of carbonate of lime, while slower in their effect, naturally stimulate clover growth and lead to an increase in fertility, which ultimately paves the way to the establishment of the higher producing and persistent pasture types.

*—D. Merry, Instructor in Agriculture, Nelson.*

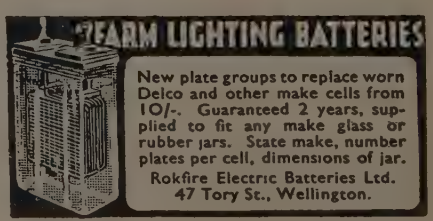
# North Canterbury.

EVEN with the aid of the free railage on lime there are still many farmers who are so situated that cartage from railhead to farm raises the cost of liming to a prohibitive figure. In addition, supplies cannot always be obtained when it suits the farmer to apply it. At this time of the year top-dressing is in full swing all over the country, and local works are unable to keep up with the demand.

Strange as it may seem, there are many farms in North Canterbury which have outcrops of quite good-quality lime, and yet this same land responds wonderfully when top-dressed with first lime, and then phosphate. In several instances the difficulty of obtaining supplies at the right time and the all-important factor of cartage cost has been solved by bringing the mountain to Mahomet. Small groups of farmers have banded together and engaged a contractor to crush their own lime.

The contractor sets up a pulverizer driven by a tractor, erects a temporary chute if necessary, and crushes lots of up to 500 tons. One contractor has, in addition, a lorry fitted with a top-dresser and he is crushing, carting around the farm, and spreading 1 ton to the acre at a cost of £1 1s. 8d. To buy lime, cart from railhead, and spread would cost £1 5s. 10d. on the same property. Under this system of liming the farmer is not so inclined to put on small quantities which often give little response. Initial dressings of up to 30 cwt. are being made, and under the circumstances one good application every three years will probably be the most economical for these people.

*—A. S. Nash, Instructor in Agriculture, Rangiora.*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# Central Canterbury.

BECAUSE of the low average rainfall experienced in the area between the Waimakariri and Rakaia Rivers it was at one time considered that the use of lime on pastures was not likely to be of any great value, and the experiences of most farmers appeared to support this view. However, the quantity of lime usually applied seldom exceeded 5 cwt. per acre, and this in most cases was too little to give any response.

In the top-dressing trials carried out in the district by the Department different rates of lime have been tried out and some excellent responses obtained, especially where applications of a ton to the acre have been applied. In many instances phosphates have given little or even no visible responses where initial applications of lime were not also made. Although occasionally no definite response is given to lime, it can be said that, in general, the application of lime is essential if the best results from phosphatic fertilizers are to be obtained.

### Establishment of Clover.

Cases have been brought to notice where, prior to the use of lime, it has been impossible to establish clover successfully. Where there is the least evidence suggesting a deficiency of lime in the soil, such as difficulty is establishing clovers and the presence of sorrel (which, however, is also often an indication of soil depletion), no time should be lost in making an application. The Department's recommendation is an application of 1 ton of lime per acre when the pasture is laid down or as an initial application on established pastures, followed by 5 cwt. every two or three years.

That the farmers in this district are fully alive to the value of lime is shown by the remarkable increase in its use over the last few years. The quantities delivered at officered railway-stations for the twelve months ended 31st March for the years 1935, 1936, and 1937, were 4,367 tons, 5,087 tons, and 7,244 tons, respectively. There was therefore an increase of nearly 70 per cent. over this period.

These figures, of course, do not take into account any lime that might be carried direct from limeworks, but the quantity so delivered is probably very small. Had works been able to cope with orders the increase would have been considerably greater.

### Indirect Effects.

An aspect of lime which is perhaps not fully appreciated is its indirect effects. The person who adopts a policy of liming not only profits by the immediate responses he obtains but will also, provided, of course, he does not deplete his land through overcropping, reap the benefits of accumulative fertility brought about by the stimulation of clover-growth and general improvement in sward density. The use of lime has aptly been described as an investment.

*—L. W. Blackmore, Instructor in Agriculture, Christchurch.*

# South Canterbury.

AN indication of the amount of lime being used in South Canterbury is given in the following table, which shows the amounts delivered at officered railway-stations and hence does not include that carted from local works by lorry and by the farmers themselves :—

| | Tons. |
|---|---|
| 1934–35 .. .. | 4,588 |
| 1935–36 .. .. | 5,587 |
| 1937–38 .. .. | 11,670 |

The increase of over 100 per cent. between 1936 and 1937 is interesting, and gives an indication of the increasing popularity of lime.

At a first glance it might be thought that this rapid increase has been brought about by an endeavour on the part of the farmer to reduce his general costs by using more lime instead of the more expensive artificial manures. That this is not so is indicated by the following table based on figures derived in a manner similar to that employed in producing the foregoing except that the latter figures are absolute—*i.e.*, there are no local works from which fertilizers can be carted by the farmers themselves :—

| | Tons. |
|---|---|
| 1934–35 .. .. | 12,553 |
| 1935–36 .. .. | 13,160 |
| 1936–37 .. .. | 15,211 |

### "An Investment."

In the main, this increase can be accredited to three principal causes—*i.e.*, cheaper and more efficient methods of distribution, the general rise of prosperity, and the fact that farmers as a whole are becoming more conversant with the results to be obtained by liming. Liming can be considered as an investment.

The total area of land in grasses, clovers, and lucerne in 1935–36 was 616,072 acres, and in the same period the amount of lime delivered on rail was 5,587 tons. Increasing this latter figure to 7,000 tons to allow for lime carted direct from works, it can be seen that the amount of lime sown per acre was about ¼ cwt. Allowing for a similar area, say, 650,000 acres for

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1936–37 season, and taking the amount of lime delivered as 12,000 tons, the rate of sowing was about ½ cwt. per acre.

Since the areas given do not take into consideration the amount of lime used for sowing with turnips, rape, &c., it will be seen that these amounts of ¼ cwt. and ½ cwt. of lime per acre respectively will have to be reduced still further. The indications are, therefore, that there is ample scope for the application of more lime.

Despite the fact that South Canterbury is well supplied with natural limestone deposits and, further, even though the bulk of the soils are wind-borne loess, which is generally considered to be highly fertile under normal circumstances, repeated analyses and experimental work have shown that there are definite responses to treatment with lime. Lime-requirement studies have shown that the soil may be deficient in lime to the extent of 4 tons to 5 tons per acre.

As stated above, there has been an increase in the amount of lime used in the district, and possible reasons were given for this increase. The knowledge that the soil is deficient in available lime has also contributed to this increase.

There are at present in operation in South Canterbury two works which supply the bulk of the lime requirements for the district, and quantities of lime are also "imported" from Oamaru. The two local works both have access to the railway, so that transport is efficient and there is no cost for delivery to the nearest siding.

**Enterprising Farmers.**

In recent years enterprising farmers with suitable limestone deposits on their holdings have turned to producing all the lime they require themselves, and one or two are in a position to supply to their neighbours. The plant required is not elaborate and costs little to run. One farmer estimates that it costs him only 6s. per ton to crush and bag.

Local conditions and variations in the quality of the limestone available render this procedure difficult or impossible for large numbers of the farming population, so that it is not to be expected that this system will become general. However, modern methods of lime-distribution have done much to reduce the cost and the labour involved.

Haulage contractors generally undertake to sow lime as well as to cart it, and it is now a common sight to see a truck fitted with a lime-sower moving across a field with considerable rapidity. The lime is carried on another truck and is transferred to the sower when required. The average cost per acre is about 21s. 6d. taking the distance from the railhead as averaging seven miles. This rate is for sowing 1 ton per acre.

*—J. A. S. Miller, Instructor in Agriculture, Timaru.*

# West Coast.

THE West Coast of the South Island from Ross northward has abundant supplies of excellent limestone. Some of the outcrops are of immense size, but in places are rather inaccessible. There are many deposits well placed for working, however, and the needs of farmers can be promptly supplied by the present producers of agricultural lime.

The importance of adequate supplies of lime at a reasonable price for farm requirements is now fully appreciated by farmers on the West Coast. It can be said that the use of lime in the district has an influence on crops and pastures greater than in any other part of New Zealand. This may seem an extreme statement to make, but the facts are that useful crops will not thrive on the unlimed land, and even fertilizers of the basic slag or Nauru phosphate type give but meagre results on unlimed land, and the purchase and use of superphosphate is practically a waste of time and money unless applied to land that has had at least 1 ton of carbonate of lime per acre. This quantity is, however, insufficient, and initial quantities of from 30 cwt. to 2 tons per acre of lime should be aimed at by the farmers of the Westland district.

It is patent to any observant person that liming is a first essential in West Coast farming. The various experiments carried out on the grasslands of the district showed such a marked and rapid response to lime as to be referred to by visitors as spectacular results. Experiments during a manurial survey of the West Coast were at times laid down on old, rough, depleted pastures, consisting mainly of brown-top and weeds.

Even in these cases the response to lime and lime plus phosphates was rapid in almost all cases, and in most cases the limed plots soon developed a growth of white clover, which was followed by the appearance of such grasses as perennial rye-grass and crested dogstail, until what was previously unproductive grassland was, on the limed areas, transformed into good mixed and well-grazed pasture land.

Lime also has a most beneficial influence on the growth of root crops, and cases are on record where swedes on the limed portion of a field yielded up to 56 tons per acre, while on the unlimed portions they were almost a total failure with the fertilizer-mixture similar throughout the crop, proving conclusively that the use of lime is fundamental to successful cropping in the district.

*—R. McGillivray, Fields Superintendent, Christchurch.*

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# Southland.

SOUTHLAND is becoming increasingly dependent on lime for manuring purposes—and rightly so, for there is not another province in the Dominion that responds more readily to liming. Figures show very plainly that this province is far ahead of any other in the amount used, and farmers now realize not only the value of lime on the soil for the betterment of the growing capacity of their crops, but also the fact that without lime many crops would succumb completely to disease.

To-day Southland's old standby for winter feed, the turnip, has lost a great deal of its prestige as a safe and satisfactory crop. Turnips sown on land well supplied with lime can still produce a good supply of sound winter feed in Southland, but if the same crop is sown in a paddock for two years in succession it is very doubtful indeed whether the second crop will give satisfactory results, as club-root will take its toll heavily in this crop.

Club-root has caused very serious damage in Southland this year, and the farmers know that without lime being applied to the soil it would be even worse. A splendid example of this was shown on one farm. Lime was being applied to the ground on which swedes were being sown. A lorry was being used to convey the lime from the railway to the paddock, and it was loaded from the lorry on to a wagon standing in the field. Two tons were stacked on the wagon after each visit of the lorry, and as it was being sown as carted the wagon would be shifted along the paddock a short distance with each 2 tons sown.

In this way the whole of the paddock, with the exception of the small areas over which the wagon stood, was limed. The resultant crop of swedes proved to be one worthy of Southland soil and was absolutely free from club-root, with the exception of the small areas above which the wagon had been standing and which had received no lime at all.

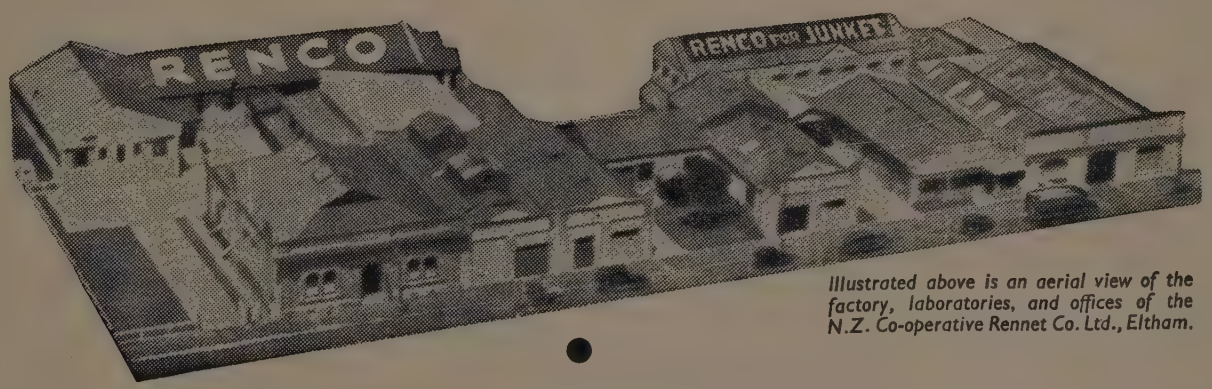
This is a splendid example of how lime helps to combat one of the diseases which cause worry to the Southland farmer.

*—W. L. Harbord, Instructor in Agriculture, Invercargill.*

---

The effects of skim-milk application to the soil around peach-trees was forcibly demonstrated in an orchard at Te Kauwhata. During the early spring, just as the trees were commencing growth, skim-milk was tipped around several trees. About 4 gallons were given per daily application. No. 1 tree received approximately ten applications, No. 2 approximately five applications, and No. 3 no applications. A further two trees which received approximately fifteen applications died immediately. At the beginning of November No. 1 tree had practically succumbed, No. 2 tree had definitely been retarded compared to No. 3, which was in a healthy condition. The trees were all the same age, and in the winter Nos. 2 and 3 were approximately the same size and No. 1 slightly smaller.


THE LARGEST RENNET FACTORY IN THE WORLD.




*Illustrated above is an aerial view of the factory, laboratories, and offices of the N.Z. Co-operative Rennet Co. Ltd., Eltham.*

*Manufacturers of*

N.Z. Cheese Rennet, N.Z. Cheese Colour, Elthamol Veterinary Ointment, Renco Salt Lick, and Renco for Junket.

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ELTHAM.

# Agricultural Regulations.

## Remuneration to Agricultural Workers.

BY Part III of the Agricultural Workers Act, which came into force on 18th September, 1936, special provision is made with respect to the remuneration of workers employed on dairy-farms and the conditions of their employment. As the provisions of Part III of the Act, with necessary modifications, have been extended by Order in Council to certain other classes of agricultural workers, a summary of the provisions of Part III and of the several Orders is appended for the information of employers and workers concerned.

Part III of the Act, as extended by the several Orders, now applies to—

(*a*) Workers employed on dairy-farms.

(*b*) Workers employed on farms and stations used for the commercial production of wool, meat, and/or grain, including seed (whether exclusively or together with any other purpose), other than those workers so employed who are covered by an award or industrial agreement under the Industrial Conciliation and Arbitration Act, 1925, and its amendments.

(*c*) Workers employed in orchards.

(*d*) Workers employed in market gardens (including market gardens where soft fruit is produced) situated in the Wellington and Nelson Industrial Districts, subject to the modifications set out in the several Orders in Council under notice.

### *Workers on Dairy-farms.*

(*a*) Part III of the Act provides that no child under the age of fifteen years shall be employed for hire or reward as a worker on a dairy-farm, but this provision does not apply to any child under fifteen years of age who was so employed at the date of the passing of the Act.

(*b*) Every worker must receive the minimum rates of wages prescribed by the Act, as varied from time to time by the Governor-General by Order in Council. In fixing the minimum rates of wages payable, consideration is given to the prices fixed from time to time for dairy-produce under section 20 of the Primary Products Marketing Act, 1936. The present minimum rate of wages is prescribed by the Agricultural Workers' Wage Fixation Order 1937, Serial No. 273/1937, which operates from the 1st November, 1937, to the 31st July, 1938, and thereafter until a further Order is made.

The rates of wages prescribed are as follows :—

| | Per Week. s. | d. |
|---|---|---|
| Workers under the age of 17 years .. | 18 | 6 |
| Workers of the age of 17 but under 18.. | 24 | 0 |
| Workers of the age of 18 but under 19.. | 29 | 0 |
| Workers of the age of 19 but under 20.. | 34 | 6 |
| Workers of the age of 20 but under 21.. | 39 | 6 |
| Workers of the age of 21 and upwards.. | 45 | 0 |

(*c*) No charge shall be made for board and lodging, but if board and lodging is not provided the minimum rate of wages to which the worker is entitled must be increased by 17s. 6d. a week.

(*d*) No deduction shall be made from the wages payable to a worker, except for time lost by reason of his default, or by reason of illness, or of any accident suffered by him.

#### Under-rate Permits.

(*e*) If a worker satisfies an Inspector that he is incapable of earning wages at the appropriate minimum rate for the time being prescribed, the Inspector may from time to time grant him a permit to work for such lower rate of wages as is specified therein. The permit must state the time during which it continues in force, and during that period the rate of wages which it prescribes shall be deemed to be the minimum rate of wages prescribed under the Act in respect of such worker.

A similar permit may be granted to a woman or girl employed on a dairy-farm, if, having regard to all relevant circumstances, an Inspector is satisfied that she is incapable of earning the appropriate minimum rate of wages prescribed. The Inspector may also, if he thinks fit, reduce the amount payable to such woman or girl in respect of board and lodging.

(*f*) Every worker employed for not less than four weeks continuously must receive a holiday totalling not less than seven days in respect of each twelve weeks of his employment, and a holiday of a proportionate part of the seven days for every broken period of employment. Not less than twenty-eight days' holiday in the aggregate must be granted during each year of employment, but such holiday must be taken at the convenience of the employer. If a worker's services are terminated all holidays to which he is then entitled shall be allowed to him forthwith.

If a worker is allowed a half-holiday on one day during each week of his employment he must be allowed an additional holiday of not less than fourteen days in the aggregate during each year of his employment and a holiday of a proportionate part of a fortnight for every part of a year during which he was employed. Any worker may agree with his employer to accept leave from work in between milkings on one day in each week in lieu of a half-holiday. Such leave shall be deemed equivalent to a half-holiday within the meaning of the Act.

(*g*) Before a worker commences any holiday of more than three days' duration his employer must pay his wages for the holiday calculated at ordinary rates, plus half the amount allowed for board and lodging during each week.

(*h*) Wages and allowances must be paid in full at monthly intervals, or at such other periods agreed on by the worker and his employer.

#### Wages and Holiday Book.

(*j*) Every employer of one or more workers must keep a wages and holiday book recording the name of each worker employed by him, the worker's age if he is under twenty-one, the days on which he has been actually employed, the wages paid on each pay-day, the date of payment and the period to which the payment relates, the several days on which the worker is allowed a holiday, the wages paid for each holiday, together with the date of payment and any other particulars which may be prescribed.

The wages and holiday book must be signed by the worker every time he receives payment of his wages, and his signature in each case operates as a receipt for payment. The wages and holiday book must be kept in a form approved by an Inspector, and the current book, and any wages and holiday book which was used at any time during the two years immediately preceding the date on which the current book came into operation, must be open to inspection by an Inspector.

(*k*) Every worker who fails to sign the book or who wilfully signs an incorrect entry recorded in the book is liable to a fine of £5.

If any employer makes default in payment of the full amount of wages to any

worker he shall be liable to a fine of 5s. per day for every day during which the default continues.

(*l*) An Inspector may recover arrears of wages on behalf of any worker without affecting any other civil remedies against the employer for non-payment of wages which are ordinarily available to such worker. An Inspector must not take proceedings, however, in any case where he has reason to believe that any default in the payment of wages was due to misrepresentations made by a worker to his employer.

### *Workers on Farms other than Dairy-farms.*

(*a*) The Agricultural Workers' Extension Order 1937, No. 2, Serial No. 154/1937, extends the provisions of Part III as now in force, with the necessary modifications and the further modifications set out in the Order, to agricultural and pastoral workers employed on farms and stations used for the commercial production of wool, meat, and/or grain (excluding seed), other than those workers so employed who are covered by the provisions of an award or industrial agreement under the Industrial Conciliation and Arbitration Act, 1925, and its amendments.

(*b*) In the case of a married couple, where the worker's wife is also employed on the farm or station, she should receive wages at a rate agreed upon by her husband and her employer.

(*c*) Rates of wages payable to casual workers are as follows:—

| | By the Hour. | | By the Day. | |
|---|---|---|---|---|
| | Found | Not Found | Found | Not Found |
| | s. d. | s. d. | s. d. | s. d. |
| Harvesters.. .. | 2 0* | .. | .. | .. |
| Other workers .. | 1 8 | 2 0 | 13 4 | 16 0 |
| Youths up to 18 years | 1 0 | 1 3 | 8 0 | 10 0 |

* With rations.

(*d*) On completion of twelve months' service with the same employer a worker must be given, at his employer's convenience, a total holiday of eighteen days on full pay. If a worker's employment is terminated when he has completed more than three months' service but less than twelve months' service he must be given that part of the prescribed annual holiday which is proportionate to the length of service he has performed.

(*e*) The Order continues in force until the 31st July, 1938, and thereafter until a further Order is made.

(*f*) By the Agricultural Workers' Extension Order 1937, No. 3, Serial No. 162/1937, Part III of the Act is extended to apply, with the necessary modifications and the further modifications set out in the Agricultural Workers' Extension Order 1937, No. 2 (*supra*), to agricultural workers employed on farms for the commercial production of grain, including seed (whether exclusively or together with any other purpose), other than workers who are covered by the provisions of an award or an industrial agreement under the Industrial Conciliation and Arbitration Act, 1925, and its amendments.

### *Workers in Orchards.*

(*a*) The Agricultural Workers' Extension Order 1938, Serial No. 1938/22, extends the provisions of Part III, with the necessary modifications and with the further modifications set out in the Order, to agricultural workers employed in orchards.


# News!

## Arrival of the 1938

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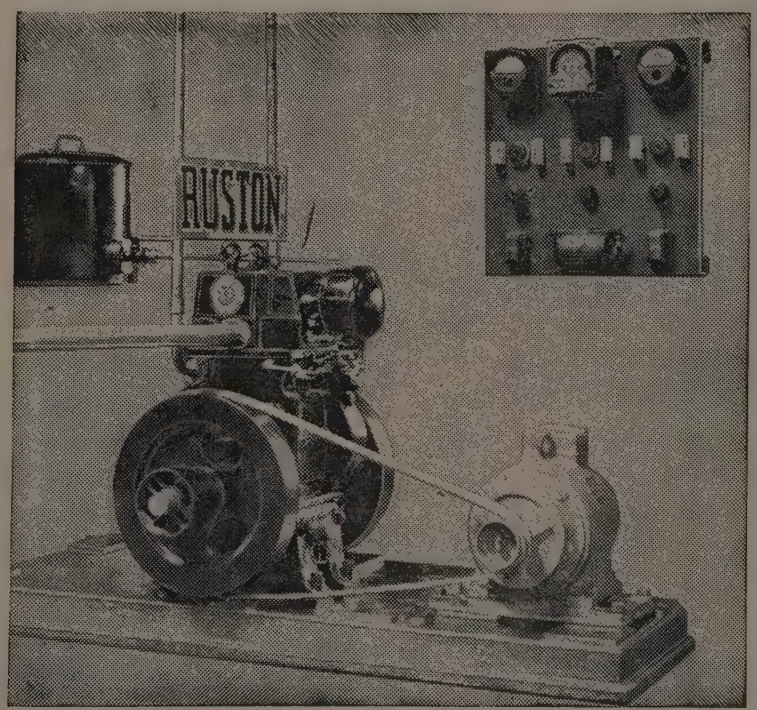


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(*b*) The minimum rates of wages prescribed are as follows :—

*Minimum Rates of Wages for Male Workers.*

| — | Twenty-one Years and over. | Amounts to be Deducted if Board and Lodgings provided. |
|---|---|---|
| | s. d. | s. d. |
| Managers .. .. | 82 0 | 17 6 |
| Other adult male workers | 78 0 | 17 6 |

*Youths Permanently Employed.*

| — | Less Board and Lodging | Net. |
|---|---|---|
| | s. d. | s. d. |
| Over 15 to 16 years .. | 20 0 | 7 6 | 12 6 |
| Over 16 to 17 years .. | 25 0 | 7 6 | 17 6 |
| Over 17 to 18 years .. | 30 0 | 10 0 | 20 0 |
| Over 18 to 19 years .. | 40 0 | 10 0 | 30 0 |
| Over 19 to 20 years .. | 45 0 | 10 0 | 35 0 |
| Over 20 to 21 years .. | 52 6 | 10 0 | 42 6 |

(*c*) When a youth reaches twenty-one years of age he must be paid wages at the rate prescribed for an adult male worker, less the appropriate amount to be deducted if board and lodgings are provided.

(*d*) A summary of the provisions of this Order, which continues in force until 30th November, 1938, and thereafter until a further Order is made, appeared in the March issue of the *Journal of Agriculture* on page 159.

### *Workers in Market Gardens.*

(*a*) The Agricultural Workers' Extension Order 1938, No. 2, Serial No. 1938/53, extends the provisions of Part III with the necessary modifications and with the further modifications set out in the Order, to agricultural workers employed in market gardens (including market gardens where soft fruit is produced) situated in the Wellington and Nelson Industrial Districts.

The Order came into force on the 22nd April, 1938, and will continue in operation until the 23rd April, 1939, and thereafter until a further Order is made.

(*b*) The Order provides that the ordinary hours of work for workers employed in market gardens shall not exceed forty-four hours per week of five days and a half. No worker shall be employed for a longer time than five hours without an interval of three-quarters of an hour for a meal. All time worked in excess of forty-four hours in any one week is deemed to be overtime and must be paid for at the following rates: First four hours, ordinary rates; thereafter, time and one-half rates.

#### Work on Holidays.

(*c*) All work performed by a worker on a statutory holiday or on a Sunday must be paid for at time and one-half rates, excepting such work as attending to forcing-stoves, greenhouses, &c., which is to be paid for at ordinary rates. In necessitous cases, where soft fruit is being picked, Sunday work may be performed without pay, provided that one day's holiday on full pay is granted in lieu of each Sunday on which work is performed.

(*d*) The usual statutory holidays shall be observed as holidays on pay in respect of workers other than casual workers. Nevertheless, a worker is not entitled to more than one week's wages in respect of any week during which a holiday occurs unless he actually works on the holiday.

(*e*) Casual workers are entitled to one day's holiday on full pay in respect of each six weeks' continuous employment with the same employer.

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**Minimum Rates of Wages.**

(*f*) Minimum rates of weekly wages are as follows :—

| | s. | d. |
|---|---|---|
| (i) Males, Youths— | | |
| From 15 to 17 years of age .. | 20 | 0 |
| From 17 to 18 years of age .. | 30 | 0 |
| From 18 to 19 years of age .. | 35 | 0 |
| From 19 to 20 years of age .. | 45 | 0 |
| From 20 to 21 years of age .. | 60 | 0 |
| Thereafter adult rates. | | |
| (ii) Males, Adults— | | |
| Weekly workers .. .. | £4 per week. | |
| Casuals .. .. | 2s. per hour. | |
| (iii) Females— | | |
| Adults .. .. .. | £2 8s. per week. | |
| Up to 18 years .. .. | £1 5s. per week. | |
| 18 to 21 years .. .. | £1 15s. per week. | |

(*g*) Every male adult worker who, on the date of coming into force of the Order, received a wage in excess of £4 shall, on and from that date, receive a rise of not less than 2s. 6d. a week.

(*h*) Minors may be employed in the proportion of not more than two to every three adults, but this proportion may be altered by arrangement between the union and the employer. In respect of piecework, a greater proportion of minors than adults may be employed.

(*j*) Girls under the age of fifteen years cannot be employed except for the purpose of harvesting peas, beans, tomatoes, and soft fruit.

**Conditions for Piecework.**

(*k*) Piecework may be worked at tying and pruning tomatoes, hand-weeding, picking peas, tomatoes, beans, and soft fruits at such rates as will enable a worker to earn the minimum wage prescribed. If a dispute regarding piecework rates arises, the matter is to be decided by an Inspector.

(*l*) An annual holiday of one week must be allowed employees on the completion of each year of service computed from the date of coming into force of the Order. Nevertheless, this provision must not interfere with any existing holiday privilege at present enjoyed by an employee covered by the Order.

(*m*) Wages must be paid weekly during working-hours. Except in the case of casual workers, forty-eight hours' notice of termination of employment must be given by the employer or the worker as the case may be, subject, however, to the right of the employer summarily to dismiss an employee for misconduct. All wages due must be paid forthwith on termination of employment. Where, for the purpose of holiday pay, it is necessary to compute wages for a day or any number of days less than a week, wages for one day shall be computed on the basis of two-elevenths of the appropriate wages payable for a week.

**Provision of Accommodation.**

(*n*) Accommodation in which the workers may change their clothes, &c., must be provided in cases where an Inspector deems it necessary. Separate sanitary accommodation must be provided for male and female workers.

(*o*) Each employer must keep a first-aid outfit on his premises.

(*p*) Every worker employed within the scope of the Order for a period exceeding four weeks must immediately become and remain a financial member of the Wellington and Nelson Labourers' and Related Trades' Industrial Union of Workers. A duty to see that his employees comply with this requirement may be imposed on an employer in certain cases. Workers are not required to pay weekly contributions in excess of an amount deemed reasonable by the Minister of Labour.


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. . . However, now that the Government has inaugurated a New Zealand standard specification for Galvanized Fencing Wire, all wire in future will be classified and labelled as being in one or other of the following grades :

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# Factors in Successful Farming.

## (6) Factors in Farm Development.

### Economic Unit Increases.

W. N. PATON, Senior Investigational Officer, Accounts Division.

LAST month's article touched on various points worthy of consideration in planning for expansion of a farming enterprise. As mentioned under both extension and intensification, this month's contribution to the series deals with economic unit increases incidental to the development programme.

Because of a lack of resources in the form of capital and labour the plan of expansion often can be too drawn out to enable a proper balance being maintained during the various stages involved. The results of shortcomings of this nature are most apparent in management problems. Difficulties brought about in management can at times be such as to disorganize the whole enterprise. Therefore the importance of a proper recognition and regard for the fundamentals underlying this aspect of farm development cannot be too strongly stressed.

Among the most serious faults responsible for cases of unsuccessful farming in New Zealand are: (1) Lack of farming and business ability; (2) lack of capital and labour; (3) paying too much for a farm; (4) the farmer not fitting the farm; (5) not paying enough attention to the stock side of farming; (6) attempting development in uneconomic stages; and (7) not following modern and scientific methods. Without attempting to arrange these in order of importance, undoubtedly the one to be dealt with in this instance must rank high in the list given.

#### Definition of Economic Unit Increase.

Each stage of a development plan should be such as to represent the full utilization of one or more additional units of labour and also of increases in buildings, plant, and equipment, &c., that can be readily brought about with a minimum of expense and alteration. Moreover, the amount of funds in reserve to meet cash outgoings at each stage should be sufficient in order to ensure that the amount of expansion being brought about at each stage corresponds with an economic unit.

Circumstances vary cases, and hence the importance of economic unit increases from stage to stage of the development programme and the ease with which they may be attained are considerably greater in some instances than in others.

#### Variation in Importance and Difficulty of Attainment.

Economic unit increases in development, in terms of labour and capital provision, whether involving extension or intensification, are more easily provided with large as against small scale enterprises. Much also depends on the kind of farming involved and the type of management followed.

Where in the usual course of the year's work considerable recourse to casual labour has to be made because of a wide variation in labour requirement month by month, such as in fruit, hop, and tobacco farming, it is feasible to expand an enterprise in stages which do not necessarily correspond closely to economic units of labour. Depending somewhat on the type of management and on the size of enterprise concerned, sheep-farming presents a somewhat similar position.

Dairy-farming, however, is a case where more than usual regard has to be paid to the compliance with economic unit increases in development. This is because the amount of work to be done month by month throughout the season does not vary unduly, and because a minimum of temporary or casual work is involved in performing regular or seasonal duties.

Another reason in the case of dairy-farming is that increase in intensification from one season to the next, except in the case of the larger farms, is difficult to bring about in sufficiently large enough stages. Hence, contemplated development-work needs to be carefully planned and safeguarded.

#### The Case of Dairy-farming.

With dairy-farming under average conditions and average management it generally takes one adult male employed full time to attend to about fifty to sixty acres running, say, thirty milking-cows—that is to say, a typical dairy-farm of, roughly, 120 acres and carrying a milking herd of sixty cows requires two full-time male adults to attend properly to farm and shed work.

In expanding such an enterprise to one carrying ninety milking-cows the development plan should be such as to enable this increase in the size of the herd (or the major part of it) to be brought about from one season to the next. This may seem a tall order, but is essentially the position to be forced. There are a number of ways in which this may be achieved in smaller stages, but not always without some risk.

Let us suppose a sixty-cow farm has been taken over containing an area of poor carrying-capacity of, say, thirty acres, while the remainder of the farm represents a fair average. In the first year or two it may be discovered through the experimental heavy top-dressing of a small paddock of the main portion of the farm that the pasture and general conditions are good enough to permit the carrying of about fifteen more cows under heavier top-dressing practice.

#### Planning an Increase.

Should draining, liming, and cleaning up, and perhaps a proportion of regrassing of the poor area, make it possible to carry another fifteen extra cows, plans could be laid to bring about a thirty-cow increase from one season to the next. By this means an extra hand could be engaged with the assurance of obtaining full labour utilization right from the start. Then, should butterfat prices fall, the position would not be so unfortunate as it would be had fewer extra cows been brought in.

Big increases of this type, of course, entail heavy expenditure. In the instance given, draining, liming, seed, fencing, extra fertilizer, extra stock, larger milking-plant, &c., might run into a total of, say, £400. Rearing some of the extra stock required could appreciably lower this total.

In the first two years the farmer might not be able to augment his initial reserve to the full extent of such an amount, but provided he had three-quarters in hand it might yet be very sound to finance the remainder. Good judgment and confidence are necessary in planning an increase of this nature.

**Spread over Several Years.**

The same development project could be spread over several years and the increased labour position met in the intermediate stages by employing a youth. Youth labour is not always sufficiently experienced or else not readily obtainable in these times. Then, should lower prices occur in the interval, the full stage of improvement might be held up for some years with little extra butterfat-production to carry the overhead of development expenditure committed to date.

Where it is possible to rent an adjoining area temporarily to make up the full economic unit of thirty extra cows during the progress of the development plan the work can be spread over more years. Just as it is a wise and sound practice to buy in lean years, so also is it sound to bring in development increases with the turn to raising prices.

Rising prices generally continue long enough to enable a development stage to be completed before a fall sets in again, provided the plan is expeditiously carried out. There is the advantage of obtaining materials at lower prices in lean years. For the farmer with confidence in himself and the future and with the necessary reserves on hand, lean times are the years for expansion of the farming enterprise.

**Small Dairy-farm.**

With the small dairy-farm of, say, thirty cows, an increase to sixty cows in one stage is well nigh an impossibility, except only in exceptional circumstances. What has to be done in expanding the size of enterprise in this case is more complicated and more drawn out. Nevertheless, considerable progress can be made in development and expansion at a fairly rapid rate with various combinations of schemes.

Both pigs and poultry can be rapidly expanded, as also can bees, at no great cost, and thus one or two of these can be employed in combination with herd improvement and increased carrying-capacity. Increased carrying-capacity can be effected in several ways, such as the extension of the productive area, the progressive laying-down of better pastures and heavier top-dressing, better grazing management and pasture conservation, &c.

With the combination of many of these methods of increasing carrying-capacity the herd can often be increased appreciably in size. Taken together with rapidly expanding side-lines, the effective utilization of extra labour need not present undue difficulties.

**Other Kinds of Farming.**

Sheep-farming varies so greatly in size of enterprise and also in type that it is extremely difficult to supply anything very useful on the size of economic unit increases. These can only be arrived at satisfactorily from a study of the individual cases. The variation in price that obtains with mutton, lamb, beef, and particularly wool, is such that it generally takes an average of about five years' returns in order to ascertain closely what definite progress and profits are being made.

Hence in sheep-farming it is imperative to set aside reserves from good seasons in order to tide over the effects of poor seasons. At the same time, further reserves should be built up to be utilized on expansion and development measures at suitable times.

**Mixed Farming.**

With mixed farming, especially where it concerns a proportion of cash-crop production, success lies in the direction of switching from one thing to another according to the movement of price trends and cycles. The drawback to such a management policy is that intensification methods with the varied lines gone in for are more or less precluded because of

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the necessity on occasions of having to terminate any one or more lines for a period, as necessity may demand.

This does not necessarily mean that economic unit increases are unimportant, but that they are taken into account in the combination and dovetailing of the lines followed rather than in the separate parts. Management ability and business acumen are important in being able to bring about rapid changes with a minimum of expense and undue disturbance of the farm as a whole at any given time, and of being able to anticipate market movements more or less in advance.

Success obtained from chasing rising prices and avoiding falling prices would be negatived if all farmers of the class concerned were equally astute. Hence, success along these lines is purely relative, and is responsible for introducing a little more of the gambling aspect into mixed farming, of which it ordinarily contains more than most other kinds of farming.

### Varied Farming.

In straight-out pig-farming it takes about one whole-time unit of labour for every thirty to fifty breeding-sows, while in poultry-farming a typical figure for one whole-time adult male is somewhere about 500 laying fowls. With fruit and tobacco farming so much casual and temporary labour is employed throughout the season that the position is fairly flexible as regards necessary permanent labour.

With fruit much also depends on yields per acre or per tree. Heavy-yielding orchards require more permanent labour per acre than do light-yield orchards. However, about one permanent worker is required for something like 2,000 bushels to 2,500 bushel cases of apples. In tobacco-farming one permanent worker is required for approximately every six acres, or 5,000 lb. of tobacco. These standards are all very approximate, as much depends on conditions in particular instances, the management practice followed, and general efficiency of workers and of plant and equipment.

### Small Farms.

In difficulty of expansion and development small farms representing various kinds of farming are in much the same position as dairy-farms, and therefore warrant special comment. The unimproved value of farming land, quality for quality, is generally higher for small areas than for larger ones. Although the steading may be of humbler proportions and not so well equipped in the case of the small farm as compared with larger farms, it nevertheless works out at a considerably higher overhead per acre. On the average, this increase in overhead becomes increasingly heavier as smaller and yet smaller areas are considered.

Boundary fencing, installation charges of laid-on local-body water or power, roading into homestead, farm buildings, plant and equipment, implements, &c., are other examples of less moment individually, but of similar effect to steading with variation in the size of the farm. Thus, not only is the unimproved value, but also the value of improvements, higher per acre for small than for large farms. Small farms generally include little unimproved land, and thus intensification provides the main avenue for expansion.

### Small-scale Farming.

Going in for a small farm is mostly an indication of lack of capital, and, as a rule, little is kept in reserve from the outset with which to meet possible contingencies. Supporting a growing family on a small farm also intensifies the general position outlined. Hence in small-scale farming greater industry and intensification is usually in evidence.

In most cases development-work has to be financed from farm income, and as the small farmer (because of his higher proportion of fixed costs) is hardest hit by falling prices his position is an anxious one as regards expansion. The demands of the growing family can call for urgent expansion at times which are least convenient. Therefore the expansion programme of the small farmer needs to be put into effect at the earliest possible opportunity and rapidly carried ahead, particularly during periods of rising prices.

### Organization of Management.

As small farmers usually find it difficult to expand to the extent where a full-time hired employee can be fully utilized they need to organize their management so efficiently that they are enabled to carry on alone, with at times some assistance in work of a lighter nature from their wives and at later periods from children of school age. With a small dairy-farm the stock should be of the highest possible productive capacity in order that high total butterfat-production may be obtained from a limited number of cows without the extra work entailed with more stock of lower average capacity.


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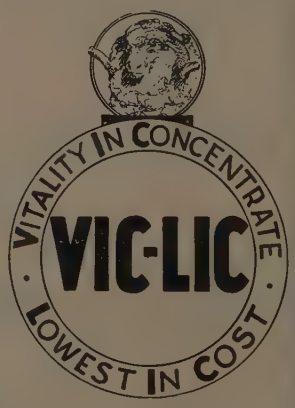


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Together with pigs exploited to the maximum of the liquid food supply supplemented with grazing, roots, concentrates, &c., a very high gross return per acre is possible. With pigs it is extremely important to arrange farrowings to occur at the most suitable periods, and to dispose of the pigs at suitable ages and numbers in order that the closest correspondence is obtained between the seasonal variations of food requirement of the pigs and the seasonal variations in the food-supply.

### Side-line Specialization.

To the man who is handy with carpentry tools rapid expansion at low cost can be made with poultry and bees. But these kinds of farming, whether depended on solely or as side-lines, call for considerable ability and painstaking effort, and unless undertaken in a thorough and proper manner they may prove unprofitable. The production of grass and clover seed and the raising of cut flowers or horticultural seeds, bulbs, and roots can be made decidedly profitable if properly handled.

On the small farm it is as well to have all members of the family concentrate and specialize in some one side-line, even with school-children. Out-of-the-ordinary attempts in a very small way can prove the beginnings of what ultimately may be very profitable undertakings of greater than side-line dimensions. By such means the burden of the demands of the growing families of small farmers can be met.

Some of the members of the family may readily set themselves up in later years in the sole kind of farming which they undertook in their youth as a part-time side-line. With small farms, therefore, it is not so much a problem of economic unit increases in development in terms of fully-employed labour-units as of part labour units within the family.

### Conclusion.

Development-work represents capital expenditure not only as regards materials, plant, equipment, &c., but also as regards labour. The farmer may supply the extra labour at no added cost to that of maintenance labour, but he has then to reckon with non-labour costs before any appreciable benefit can be obtained. Many are apt to give insufficient consideration to this fact. Others plan development in a very slip-shod manner, with little regard for the economic units peculiar to the kind of farming followed.

Often the work is undertaken at wrong periods and not carried through rapidly enough. Again, where diversification of farming is involved not enough thought is given to the interlocking of the various forms of agriculture and how best these can be matched in complementary and supplementary effects. Even where a single kind of farming is followed supplementary effects can be obtained in more than one direction. Too often it is found that the stock side is neglected.

It cannot be too strongly emphasized that the practice of entirely depending on purchased replacement stock is precluding the valuable scope of intensification possible through utilizing high-productive capacity stock. Also, breeding and raising own replacement stock is one safeguard against disease.

By attempting extension of the farming enterprise in such a slow manner that the extra unit of labour cannot be profitably employed until a considerably later stage means only that unit production in the meantime falls as the expansion programme proceeds, and thus defeats in part if not as a whole the very object aimed at—namely, higher returns. Farmers should recognize that they are dealing with units, which at times may be quite elastic, yet if not intelligently handled can impose considerably rigid limiting effects.

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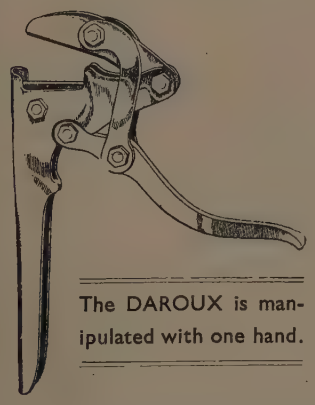

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# Pedigree-sow Records.

M. J. SCOTT, Superintendent of the Pig Industry.

OF the 75 sows recorded during the quarter ended 31st May, 1938, forty-eight had litters sufficiently good to be included in one of the five grades set out below :—

| Grade. | Litter-weight. | |
|---|---|---|
| | At Three Weeks. | At Eight Weeks. |
| | lb. | lb. |
| 1 .. .. | 120 | 360 |
| 2 .. .. | 100 | 300 |
| 3 .. .. | 90 | 270 |
| 4 .. .. | 80 | 240 |
| 5 .. .. | 70 | 210 |

In the following lists the owner's name and address are given, followed by the registered number of the sow and the grade of litter produced.

### Berkshires.

Barnaby, J. F., Rongotea, Palmerston North, 11143/5 ; Bickers, W. P., Ridgelands, Feilding, 11676/4 ; Gough, T., Kamo, Whangarei, 11920/3 ; Kaingaroa Pig Club (G. A. Morpheet, Secretary), Kaitaia, 12810/4 ; Kaitaia Pig Club (W. J. Bell, Secretary), Kaitaia, 12790/5 ; Kahunguru Pig Club (R. Gilmore, Secretary), Nuhaka, 12811/3 ; Mangahera Pig Club (L. Donald, Secretary), Tolaga Bay, 12815/2 ; A. Mulholland, G.P.O., Puha, Gisborne, 12183/4 ; Rangitira Pig Club (G. D. Withers, Secretary), Waipaoa, Gisborne, 12598/1 ; S. Unwin, Stoneycroft, Winchester, 10387/2 ; Manutuke Pig Club (W. A. McCliskie), Manutuke, Gisborne, 12188/5 ; Takaka Pig Club (W. J. Jenkins), Takaka, 12878/5.

### Large Blacks.

Boland, Mrs. R. A., Longford, Nelson, 872/2 ; Hall, G. W., and Sons, Kio Kio, R.M., Otorohanga, 1261/5, 1536/3 ; Pedersen, N. P., Kauwhata P.O., Palmerston North, 1109/2 ; Whitelock, G. M., Newbury, R.M., Palmerston North, 1590/4, 1320/1.

### Large Whites.

Bodle, D., Matarau Road, Whangarei, 4829/4 ; Candy Bros., Pokuru, Te Kawa, 4697/1, 4912/1 ; Canterbury Agricultural College, Private Bag, Christchurch, 4764/4.

### Tamworths.

Bell, A. G., Kaitaia, 7605/3 ; Cheltenham Dairy Co., Makino, Feilding, 8740/2 ; Donald, L., Tolaga Bay, 9326/2 ; Fieldhouse, H. E., Rongotea, 7314/5 ; Gillett, G. E. and P. G., Sefton, North Canterbury, 8295/2, 8295/5 ; Hauiti Pig Club (P. Sadler, Secretary), Tolaga Bay, 8967/3 ; Jardine, G. F., Private Bag 94, Wairoa, 8812/1 ; Jones, E. J., Eureka, Waikato, 9701/5, 6288/5 ; Kaipara Flats Pig Club (B. Andrews, Secretary), Kaipara Flats, —/4 ; Kopane Pig Club (E. Whitelock, Secretary), Kopane R.D., Palmerston North, 5625/2 ; Matakana Pig Club (I. Wilson, Secretary), Takatu Point, Whangarei, 6349/3 ; Morrison, D. G., Maungatapere, 4211/4 ; Nuhaka Pig Club (D. A. Hughes, Secretary), Wairoa, 9726/5 ; Ohau Pig Club (C. Evans, Secretary), Levin, 9745/4 ; Ogle, F., Austin Road, Normanby, 3514/5 ; Puha Pig Club (Geo. Brown), Puha, Gisborne, 9403/4 ; Rangitukia Pig Club (J. E. Ormundsen, Secretary), Tiki Tiki, 8911/5 ; Scott, W. C., Glen Oroua, 8479/3 ; Suter, E., Waiau Pa, 8761/5 ; Swaney, A. J., Whatawhata, 9402/4 ; Te Arai Pig Club (M. F. Robb, Secretary), Manutuke, 9574/3 ; Wagner, L. C., Patutahi, Gisborne, 4173/5, 7693/5 ; Wairoa Pig Club (Mrs. Watson, Secretary), 11 Mahia Avenue, Wairoa, 9697/5.

# Slaughterings of Stock.

THE following return of slaughterings of stock at meat-export slaughterhouses and abattoirs for the twelve months, May, 1937, to April, 1938, has been compiled by the Live-stock Division :—

| | Cattle. | Calves. | Sheep. | Sheep, of which Ewes. | Lambs. | Pigs. |
|---|---|---|---|---|---|---|
| **North Island.** | | | | | | |
| Meat-export slaughterhouses— | | | | | | |
| Auckland .. .. | 140,234 | 596,951 | 313,695 | 188,882 | 1,146,926 | 469,882 |
| Poverty Bay - Hawke's Bay .. | 28,873 | 41,174 | 532,957 | 203,076 | 1,094,736 | 47,303 |
| Taranaki-Manawatu .. .. | 88,083 | 246,812 | 478,419 | 232,046 | 1,447,945 | 263,878 |
| Wellington-Wairarapa .. | 35,793 | 27,523 | 432,740 | 174,930 | 1,015,563 | 60,619 |
| Totals .. .. .. | 292,983 | 912,460 | 1,757,811 | 798,934 | 4,705,170 | 841,682 |
| Abattoirs .. .. .. | 119.236 | 39,458 | 361,802 | 210,568 | 58,718 | 115,844 |
| North Island totals .. | 412,219 | 951,918 | 2,119,613 | 1,009,502 | 4,763,888 | 957,526 |
| **South Island.** | | | | | | |
| Meat-export slaughterhouses— | | | | | | |
| Nelson-Marlborough .. .. | 422 | 8,911 | 13,698 | 7,275 | 166,574 | 13,387 |
| Canterbury .. .. .. | 16,676 | 39,087 | 473,726 | 336,297 | 2,318,910 | 49,341 |
| Otago-Southland .. .. | 10,942 | 47,932 | 266,725 | 225,966 | 2,562,026 | 5,716 |
| Totals .. .. .. | 28,040 | 95,930 | 754,149 | 569,538 | 5,047,510 | 68,444 |
| Abattoirs .. .. .. | 60,015 | 15,100 | 248,618 | 120,231 | 38,849 | 29,228 |
| South Island totals .. | 88,055 | 111,030 | 1,002,767 | 689,769 | 5,086,359 | 97,672 |
| **Dominion.** | | | | | | |
| Meat-export slaughterhouses .. | 321,023 | 1,008,390 | 2,511,960 | 1,368,472 | 9,752,680 | 910,126 |
| Abattoirs .. .. .. | 179,251 | 54,558 | 610,420 | 330,799 | 97,567 | 145,072 |
| Grand totals .. .. | 500,274 | 1,062,948 | 3,122,380 | 1,699,271 | 9,850,247 | 1,055,198 |
| In addition, the following stock were slaughtered at rural slaughterhouses for local consumption during the twelve months ended 31st March, 1938 | 87,873 | 2,179 | 216,338 | .. | 19,545 | 28,293 |
| Same period, 1936–37— | | | | | | |
| Meat-export slaughterhouses and abattoirs | 427,444 | 1,044,942 | 2,580,646 | 1,488,274 | 9,558,419 | 1,004,947 |
| Rural slaughterhouses .. | 88,435 | 1,972 | 213,797 | .. | 19,883 | 27,163 |
| Same period, 1935–36— | | | | | | |
| Meat-export slaughterhouses and abattoirs | 473,665 | 1,074,518 | 2,615,383 | 1,215,856 | 8,187,464 | 973,546 |
| Rural slaughterhouses .. | 84,525 | 2,200 | 211,371 | .. | 21,402 | 26,564 |

# Farm Practice and Management.

Contributed by Officers of the Fields Division.

## Top-dressing in the Spring.

WHEN the vast possibilities inherent in artificial fertilizers as a means of increasing production are considered it is a matter for some surprise that their present widespread adoption was for so long delayed. The older farmer had great faith in the value of dung—a safe all-round manure—and he found it hard to believe that a sack of powder might be more potent than a whole cartload of farmyard manure. Moreover, having no established technique to guide him in the proper use of the new fertilizers, he could only learn by slow and sometimes costly experience. Many of his earlier mistakes are still being repeated to-day.

If full value is to be obtained for money spent on fertilizers, they must be purchased with discrimination and applied to the best possible advantage. As in the past, much money is still being largely wasted—or at best ill-spent—through the failure of the farmer to appreciate just what his soil requires and under what conditions the different artificial fertilizers can best be used.

**Fig. 1.—Top-dressing by hand.**

### Choice of Fertilizers.

Generally speaking, phosphatic fertilizers can invariably be applied with advantage, and it will usually be found that of these, superphosphate, with lime if necessary, is superior to most and inferior to none on the grounds of economy and efficiency.

The soil requirements in regard to lime and potash may be best determined by the results of local practice, or by trial on the farm itself, and it should be noted that the responses obtained to these may show considerable variation on different areas even on the same farm. For this reason it is a very safe guiding rule that any fundamental variation of a proved manurial practice should first be tried out on a small scale by the farmer himself.

In this connection clover will provide a valuable barometer, as it is highly sensitive to deficiencies of phosphate, lime, and potash. It should also be realized that the clover content of a pasture is of great importance in providing the cheapest and most valuable source of nitrogen.

### Time of Application Important.

Apart from the type of fertilizer used, the actual time of its application, although it does not greatly affect the total yearly production of a pasture, may materially affect the period during which the bulk of the production is obtained. In this respect the practice of early autumn top-dressing has much to recommend it. Unwise spring applications are apt to lead to an embarrassment of riches and to aggravate the already acute problem of ill-balanced seasonal production. While autumn top-dressing is invariably safe, spring applications should be made with some discretion and forethought regarding the purpose in view.

The problem of spring applications of fertilizers must necessarily be considered in conjunction with any fertilizers which have already been applied during the autumn. It has been shown that the quantity of phosphate which can be completely utilized in a year depends largely on the size and nature of the crop. For this reason the quantity of fertilizer

which can economically be applied to a pasture must to some extent depend on the quality of the existing sward as well as on the potentialities for improvement, and the farmer must keep this aspect in view when deciding on the amounts of fertilizer he can profitably apply.

### Applications of Phosphates.

Where the farm has already received a light application of phosphates in February or March the hay and ensilage fields will benefit from an additional application of about 2 cwt. per acre when the clover is commencing active growth in the spring—usually between August and September. The remainder of the farm may then be given a second dressing of about 2 cwt. of superphosphate in November. This November treatment is particularly valuable in a dry season, and greatly assists in prolonging the grass growth into January.

Young pastures which were sown during the previous autumn must not be overlooked, and, even though they may have received a liberal dressing at the time of laying down, an additional application of 2 cwt. to 3 cwt. of superphosphate in the early spring is of immense value in consolidating the establishment and promoting vigorous growth.

As already stated, spring top-dressing of pastures should be done with care and discretion. This applies with even greater force to the fertilizing of lucerne stands, and where weed competition is to be anticipated no fertilizers should be applied to this crop while it is in the dormant stage. Like any other farm crop, lucerne responds well to phosphates, and an application of about 2 cwt. of superphosphate per acre after active growth has commenced, or, better still, after the first cut, will greatly increase the yield and assist in prolonging the life of the stand.

**Fig. 2.—Top-dressing by machine.**

### Nitrogenous Fertilizers.

While the indiscriminate use of artificial nitrogen is not to be recommended, 3 cwt. per acre of ammoniated super or 1 cwt. per acre of sulphate of ammonia may sometimes be applied with advantage to selected paddocks in July and August to provide green feed for early-calving cows. Where sulphate of ammonia is used an equal amount per acre of ground limestone should also be sown.

### Lime and Potash.

Although these are usually applied in the autumn they may, if their use is considered advisable, be sown in the spring. Care should be taken, however, particularly with the latter, to see that the soils are such as will yield a profitable response to these manures. Ground limestone may be applied at rates up to 1 ton per acre, and potash salts at about 2 cwt. per acre.

### Mixing of Fertilizers.

Sulphate of ammonia is more easily sown through the drill, and gives better results if it is mixed with an equal amount of carbonate of lime. It should be sown, however, immediately after mixing, and should on no account be mixed in the drill.

If small dressings of lime are being applied they can be mixed and sown with the superphosphate. If superphosphate and slag are being mixed the addition of a small quantity of potash salts will help to prevent heating and setting. Potash salts can be safely mixed with superphosphate, lime, or sulphate of ammonia, but if used with slag it should be sown immediately after mixing.

*—P. S. Syme, Ruakura.*

## Transplanting Autumn-sown Onions.

MANY farmers with home gardens have neither the time nor suitable soil for the growing of autumn-sown onion-plants and prefer to buy plants in the early spring. These are transplanted in the ground, and give less trouble in growing and are more likely to succeed than if the seed were spring-sown.

Before the onions are transplanted the land should be worked some time so that it is fine and firm, for onions do poorly on recently-ploughed and hurriedly-prepared soil. Applications of up to 1 ton of lime per acre should be given some time before transplanting to soils deficient in lime. The onion-plants should be about the thickness of a lead pencil, or slightly less. They will keep fresh quite a long time providing they are not left exposed to the sun's rays.

Before transplanting, the roots and leaves can be shortened for ease of handling. See that the ground is in a fit state before planting. Onions will not thrive where the ground is waterlogged, and it is always better to wait until it is reasonably dry.

Plant the onions in rows 1 ft. apart and 4 in. apart in the rows, just burying the roots of the plant and allowing them to fall over on one side if they will not stand upright. The plants soon strike, and in a few days will be growing upright.

Just before planting, broadcast super or super and bonedust mixed at the rate of 1 cwt. to 2 cwt. per square chain on the surface of the ground. Later cultivation should be shallow and only sufficient to keep the area free of weeds.

*—J. E. Bell, Instructor in Agriculture, Auckland.*

# Care in Washing the Cow's Udder.

WHEN a cow has been leg-roped her udder and teats should be washed with clean water. In cold weather, or at any time, tepid water is quite permissible for this purpose, but hot water should never be used—that is, water above bloodheat.

The most important quality of the water to be used, however, is absolute cleanliness. By cleanliness is meant not only freedom from visible dirt, but also freedom from bacteria. Where the water is held in a bucket, and particularly where cloths are used for washing, there is a grave danger of contamination of the water and the cloth. This prohibits absolutely clean washing, and also involves the risk of transferring disease germs from cow to cow. Even the most scrupulous care of the cloth and the most frequent changing of the water will not overcome this danger.

**Washing the cow's udder with clean water and without unsanitary cloths.**

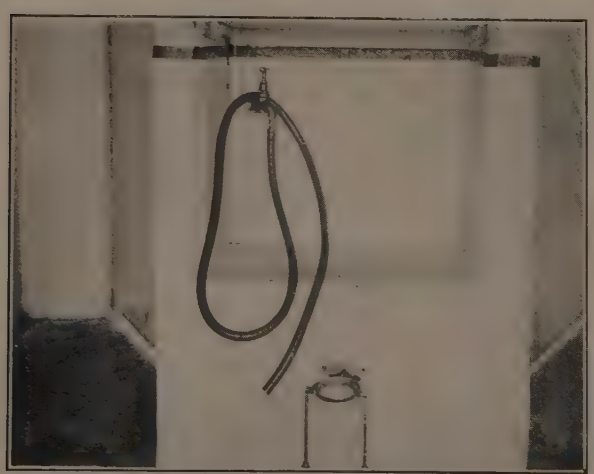
### Simple but Effective Device.

But the difficulty is easily avoidable, and at the same time the details of washing are simplified. All that is required is a water-tap fitted in front of the "dummy" with rubber tubing attached long enough to reach to the cow's udder. No cloth is then required for the milker's hands, and only the running water, fresh from the pipe, and the milker's hands are used for washing. Hands are much more easily kept clean than cloths.

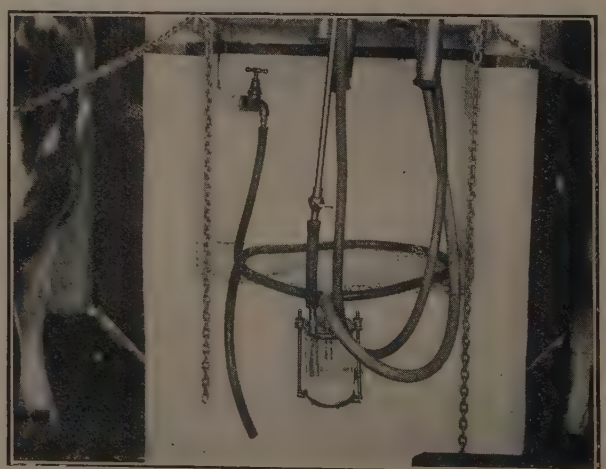
The teats themselves and the ends of the teats are the most important parts to wash carefully. In machine-milking the partial vacuum may draw dirt from the pores of the cow's teats and mix it with the milk. This can be prevented only by thorough washing. The teats may then be dried with a cloth which has been wrung out after being rinsed in clean water. Where cloths are used they must be thoroughly washed and sterilized daily, but, as previously suggested, cloths are definitely undesirable.

The accompanying photographs were taken in the milking-shed on the Ruakura Grazing Trials and Feed-flavour Investigation Farm at Ruakura Farm of Instruction. It should be noted that the water-tap is fitted with a tapered nozzle which has a screw thread. Both the tapering and the thread make a simple fitting or removal of the tubing easy.

—*E. R. Marryatt, Ruakura.*



**The "dummy" between milkings, showing the rubber tube attached to the water-tap, with a tapered thread nozzle.**



**The "dummy," situated between cows, during milking.**

# Good and Poor Ploughing of Light Soils.

Fig. 1.—An illustration of reasonably well ploughed land.

Fig. 2.—A close view of poorly ploughed land.

THE plough is the primary implement of cultivation, and the better the ploughing the easier the subsequent work of seed-bed preparation. The plough inverts the soil, burying and assisting the decay of vegetation, and brings up a layer of soil from below to be sweetened and weathered.

Vegetation must be covered if it is to decay, and a common fault in the ploughing of light land out of grass in the Auckland District is the use of a short-breasted plough, which simply tumbles the furrow slices about and does not cover the surface vegetation.

A skim coulter should always be used in ploughing lea land with a short-breasted plough. Preferably, a plough with a lea board should be used.

Figure 1 shows reasonably well ploughed land, with the surface even and all growth completely covered. Subsequent rolling, disking, and harrowing can be done easily and efficiently.

Figure 2 shows poorly ploughed land. The furrows are not properly turned, and vegetation is not covered. The uncovered grass and weeds will soon begin to grow. Subsequent cultivation with roller, disks, and harrows will be difficult and costly.

This ploughing will never give as good a seed-bed as that obtained from the ploughing shown in Fig. 1.

*—C. S. Dalgliesh, Fields Instructor, Rotorua.*

# Top-dressing in Canterbury.

AT one time it was commonly considered that pasture top-dressing in Canterbury would not pay, as the annual rainfall is lower than in most other districts of the Dominion. Later experience has proved, however, that in the majority of cases top-dressing will result in a handsome increase in the farmer's income.

The application of fertilizers is a relatively simple proposition on the plains because of the flat nature of the country, and the advent of the lorry top-dresser has resulted in a rapid increase in the area top-dressed. This cheap and easy method of application is proving very popular with the farmer on mixed-cropping land, who might not always be able to spare the time to top-dress large areas under the older methods of fertilizer distribution.

### Phosphates.

Phosphates comprise the bulk of the fertilizers used in Canterbury, and in most cases farmers are well satisfied with the results obtained from them. It is important to note, however, that in nearly all instances liming is essential before the maximum benefit can be obtained from the phosphates. As a low rainfall demands that a relatively quick-acting phosphate be used, superphosphate is by far the most popular fertilizer.

On Banks Peninsula the rugged nature of the country precludes the use of lime, and basic slag or reverted phosphate are more popular. The general effect of the phosphate is to increase the vigour of the clovers and grasses and to lengthen sward life. On the better class of land swards may be maintained almost indefinitely in a high state of production if regularly top-dressed. On the lighter lands a pasture will remain in good condition much longer if top-dressed, and it is a common sight to see top-dressed areas of such country carrying a good well-grazed sward, in striking contrast to neighbouring un-topdressed areas which are hairgrass-dominant and carrying little or no stock.

The increasing use of certified strains of grasses and clovers, as well as the introduction of subterranean clover on the lighter plains land, has further stimulated the sale of phosphate, and surprisingly good swards may be obtained on such country through the sowing of certified seeds and regular top-dressing.

It has been shown that the best time to apply phosphate is in the autumn, and the Department's recommendation is 1 cwt. to 2 cwt. of superphosphate per acre.

### Potash.

While in some parts of New Zealand there have been striking responses to the use of potassic fertilizers, seen mainly in the stimulation of clovers, evidence obtained from top-dressing trials in Canterbury shows that results from potash top-dressings in this province are negligible.

Because of this, the use of potassic fertilizers on Canterbury grasslands cannot at present be advocated, although it is quite conceivable that the whole situation might be altered at some future date as the reserves of available potash in the soil become depleted.

It is commonly believed that potassium fertilizers play an important part in maintaining the health of stock. While there is at present no actual proof of this belief, the Department is investigating the position.

**Nitrogen.**

The position in regard to nitrogen is very similar to that of potash. Its use cannot be generally recommended, except in certain specific instances. The purpose of using such fertilizers is to give a flush of early spring feed, and this is of greater importance in a dairying district than in a pastoral one.

Such dairying districts are relatively few in Canterbury, and it is in these regions that nitrogenous top-dressing might be recommended after a severe winter in order to help stimulate the spring growth. In these circumstances, a dressing of 1 cwt. sulphate of ammonia could with advantage be applied in July.

Of recent years a new sphere of usefulness for nitrogenous fertilizers has been found. This is in connection with the production of cocksfoot-seed on Banks Peninsula. Neutral ammoniated super applied at the rate of 2 cwt. per acre in May, or sulphate of ammonia at 1 cwt. per acre in August, have in many cases given increases in yield and provided a return that has yielded a handsome profit to the farmer.

*—A. V. Allo, Instructor in Agriculture, Christchurch.*

# Winter Feeding of Dairy Stock in North Auckland.

THE combination of climatic and soil conditions, together with the widespread occurrence of paspalum in pastures, makes North Auckland farming essentially "grassland farming." Except on certain farms in a few localities, crops grown for winter feeding of dairy stock are uncommon. On the flats, which form a considerable portion of the land devoted to dairying, stock are grazed during the early winter months on the rank, surplus late-summer and autumn pasture growth. When this is finished they are removed to "run-offs" on the adjacent hill land, where the ungrazed summer and autumn growth provides winter pasturage in the form of natural uncut, but poor-quality, hay.

Winter grazing on the undulating and hill country is provided by cleaning up rank growth, and later placing the stock on those areas of the farm which are not regularly grazed during the milking-season. Towards the end of the winter small quantities of hay may be provided, but this is usually kept to feed the newly-calved cows before the spring growth comes away. Considerable quantities of hay are fed throughout the winter where the farms are more intensively worked, and in a very few instances ensilage is used with the hay in the late winter and early spring.

**Small Amount of Winter Feed.**

Compared with other dairying districts, only a small and most inadequate amount of winter feed in the form of hay and ensilage is provided. If all the hay made in North Auckland were fed to milking-cows only, each cow would receive less than 5 cwt. Thus the feeding of hay could only be continued for less than six weeks.

Even with the mild climate of the north at least 10 cwt. of good meadow hay for each cow is a necessary provision.

On the same basis, the ensilage made would not provide more than six days' feeding. Even this amount has been totally inadequate to provide supplementary feed for milking-cows during the past dry season, when supplies of ensilage on some farms proved most beneficial in maintaining the milk yield.

Adequate winter feeding to bring cows into milk in good condition is essential to obtain the maximum quantities of butter-fat from the commencement of the new season. The paspalum pastures in the north do not provide sufficient early spring feed to enable maximum results to be obtained from well-wintered dairy cows. Numerous digestive troubles occur when hay alone is fed to supplement the scant pasture growth for newly-calved cows, and it is not uncommon to have stock losses at this time of the year.

**Careful Planning Needed.**

The winter feeding of stock requires careful planning for months ahead. Consideration could well be given to—

(1) The improvement of pastures by draining where necessary, top-dressing, liming, and increasing the rye-grass content of pastures. Rye-grass - paspalum - white clover pastures can be maintained on much of the land which is in paspalum to-day. The paspalum provides ample summer feed as well as a surplus for hay, while the rye-grass provides autumn and early spring feed. Where such fields are spelled in mild winters the resulting growth is invaluable for late winter and early spring feed. Further, the greater surplus of growth available in October and November is useful for ensilage.

(2) More complete management of the pastures, by which the surplus growth is made into hay and ensilage. The rank, low butter-fat-producing growth of a paspalum pasture is avoided, thereby increasing the yield and enabling good hay to be obtained instead of leaving uncut material, which deteriorates the sward and is of far less feeding value than straw.

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During the recent wet seasons farmers have increased their stocking, and this last dry summer revealed many examples of overstocking. Feed on some farms was at times insufficient to maintain the milk-yield from the cows, quite apart from closing many fields for hay.

**Feed Rations.**

With adequate quantities of hay and ensilage on hand, feeding out should commence as soon as the grass growth is insufficient. A daily ration of 14 lb. of hay with some grass for each cow will be found adequate. With ensilage the quantity of hay can be reduced, and ensilage up to 30 lb. per day may be necessary. If the hay and ensilage are fed out together the cows will soon balance the ration, and after a week the farmer can more accurately judge the quantities to be fed. Ensilage alone is unsatisfactory during the winter months.

Young stock, which should be receiving hay before the growth goes off, require ample provision of winter feed if they are to develop into high butterfat-producers. A few pounds spent on crushed oats for feeding in addition to hay during July, the hardest month for young stock, will in most cases be money well spent.

*—E. H. Arnold, Instructor in Agriculture, Dargaville.*

# Seed-production of New C23 Strain Cocksfoot.

THE new C23 strain of cocksfoot, still known by the number given to it during the early work of selecting and breeding, is now becoming better known to the farming community. Lincoln College was responsible for the introduction of this leafy strain, which is claimed to be superior in fodder-production to the better-known Akaroa and Plains types. Once the superiority was considered to be proved the task of multiplication was begun, and by 1935 sufficient seed was available to carry out further bulking up on farms additional to that at the college.

Mr. F. S. Young, of Kaiapoi, was one of the first to undertake seed-production, working in co-operation with Lincoln College. Returns the first year were sufficiently encouraging to induce him to cultivate it fairly extensively. At the present time he has 58 acres established and has recently sown another 13 acres to come in next year.

A start was made with 3 acres, sown after potatoes in the autumn of 1935, and followed by a further 10 acres in the spring of the same year. In the following autumn 7½ acres were sown, and last year 38 acres were put down. The seed from the 1936–37 season of harvest was brought under the Government certification scheme, and now seed is being ticketed in various grades, depending upon the grade of seed sown and also the rye-grass content.

**Weeds the Major Problem.**

The major problem with this crop was to harvest seed sufficiently free from rye-grass and weeds during the first year or two. Since the initial field was laid down changes have been made in the mode of establishment. The practice now is to plough out of grass or stubble in the winter, work for weeds during spring and summer, and sow early in March.

**Cutting a crop of C23 cocksfoot. Note the length of the stubble.**

The soil is a heavy silt valued at approximately £40 per acre, and is infested with Californian thistle, docks, wild oats, and twitch. In order to keep the thistles down one paddock was actually ploughed twelve times, then grubbed, harrowed, and rolled before being sown. Other paddocks have not required the same amount of working, but the winter ploughing and summer fallow is very necessary. In order to ensure a good strike the seed-bed is rolled before and after drilling, and to prevent the seed being buried too deeply turnip coulters are used on the drill.

The first sowings were made at 15 lb. of seed per acre, but with good preparatory cultivation and careful drilling 7 lb. to 8 lb. per acre is quite sufficient. Reverted superphosphate at 3 cwt. per acre is sown with the seed to give it a good start, but once it is established further manuring is not necessary.

**Management Very Simple.**

Even following the summer fallow, rye-grass and weeds are still very much in evidence the first harvest year, and some of the paddocks have not been clean enough to produce seed up to certification standard. There has been a market for unticketed seed at a satisfactory figure, however, and people have purchased it to sow for grazing only.

Management of the established paddocks is simple, because there is nothing to do, and the secret of success is to keep all stock off the cocksfoot all the year round. The tall-growing habit of cocksfoot soon smothers out rye-grass and weeds. Ripening begins early in January, and the crop must be carefully watched so that it can be cut at just the right stage. Cutting too early results in a loss of weight and low germination of seed.

The crop is cut with a binder, and Mr. Young has had an extension fitted to the rack on the big wheel so that he can leave a stubble 2 ft. to 2 ft. 6 in. high and so miss a great deal of the rye-grass. One man stooking is sufficient to keep up with the binder, and under normal conditions the crop can be stook-threshed. Two men with low lorries keep the tin mill going. In a wet season it is difficult to get the butts of the sheaves dry, and it is necessary to resort to stacking.

The charges against this crop at the beginning are considerable, and it is eighteen months before a return comes in. The necessary preparation of the land, the cost of seed and manure, and the time

actor may deter all but the most enterprising from undertaking seed-production of this grass. Once established, however, there are no expenses except the harvesting and seed-dressing.

The average yield of seed off the mill was 320 lb. per acre this last harvest, taking into account old and new areas. The loss on machine dressing has been as high as 51 per cent. with first-year seed because of wild oats and other weeds, but an average estimate of other yields is 30 per cent.

**Returns per Acre.**

The following are the actual returns per acre for the first year from a 5 acre paddock sown with Government stock seed cocksfoot :—

| *Expenses.* | £ | s. | d. |
|---|---|---|---|
| Rent, eighteen months .. | 3 | 0 | 0 |
| Cultivation, twelve ploughings— | | | |
| Grubbing, rolling, &c. .. | 6 | 0 | 0 |
| 8 lb. seed, at 2s. 3d. .. | 0 | 18 | 0 |
| 3 cwt. manure .. .. | 0 | 15 | 0 |
| Cutting, stooking, threshing | 2 | 0 | 0 |
| Machine dressing .. | 1 | 0 | 0 |
| Certification fees .. | 0 | 3 | 6 |
| First year : Net profit .. | 6 | 14 | 8 |
| | £20 | 11 | 2 |

| *Receipts.* | £ | s. | d. |
|---|---|---|---|
| 266 lb. seed, at 1s. 7d. .. | 20 | 11 | 2 |
| | £20 | 11 | 2 |

Assuming that the yield of seed would be the same the second year, the returns would be :—

| *Expenses.* | £ | s. | d. |
|---|---|---|---|
| Rent .. .. | 2 | 0 | 0 |
| Harvesting .. .. | 2 | 0 | 0 |
| Dressing .. .. .. | 1 | 0 | 0 |
| Certification fees .. .. | 0 | 3 | 6 |
| Total .. .. | 5 | 3 | 6 |
| Second year : Net profit .. | 15 | 7 | 8 |
| | £20 | 11 | 2 |

| *Receipts.* | £ | s. | d. |
|---|---|---|---|
| 266 lb. seed, at 1s. 7d. .. | 20 | 11 | 2 |
| | £20 | 11 | 2 |

This is on land capable of carrying three-quarters of a cow per acre and which, under dairying, would give a gross return of about £10 per acre, compared with £20 from cocksfoot. While it is not suggested that any one should give up dairying and undertake the growing of cocksfoot all over the farm, there is no doubt that it can be a very profitable sideline, especially for a small farmer.

The real use of C23 cocksfoot is for permanent pasture on the foothill country and parts of the plains of Canterbury as part of the permanent pasture.

*—A. S. Nash, Instructor in Agriculture, Rangiora.*

## Personal.

Mr. J. F. Filmer, B.V.Sc., Veterinary Research Officer of the Department of Agriculture, has received advice that his thesis on " Enzootic Marasmus " has been passed by the examiners for the degree of Doctor of Veterinary Science of Melbourne University. The degree will be conferred on Mr. Filmer at the next graduation ceremony.

Mr. Filmer is Chairman of the Facial Eczema Management and Research Committees.

Messrs K. A. L. Haggitt and W. P. Saunders have been appointed members of the Lake Wakatipu Rabbit Board. Mr. James Sing has been appointed a member of the Mangaoronga Board.

The recommendation to install sumps to contain shed-washings for later top-dressing for pastures and also on land intended for root crops is being followed in Taranaki, and over thirty such plants are now known. Results are everywhere very satisfactory, as the grasses in the sward respond quickly to treatment.

In the Ashburton District there are some outstanding demonstrations of the value of liming. On some farms the use of superphosphate on pastures where the land has not been limed has not given any result, but super on limed land has been quite satisfactory.

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# Cleaning "Duck-weed" from Drains.

MANY of the larger drains and water-courses which carry a considerable volume of slow-running water become choked by a dense growth of soft water-weed (*Lemma minor*), commonly known as "duck-weed." Those with experience of this weed know the damage it can do by rapidly raising the water-level in the drains, and realize the necessity for cleaning it out.

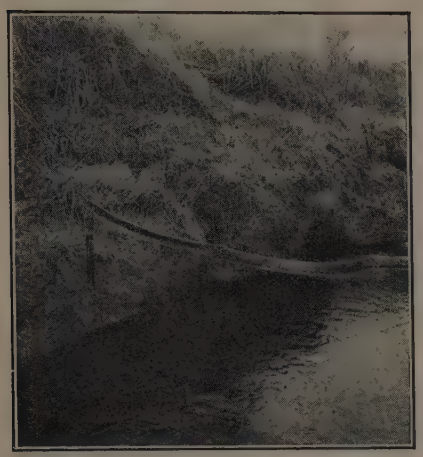

**Fig. 1.—Showing the method of attaching the scythe-blades together with the weight at the end.**

They also know what a slow job it is clearing a drain with the usual drain-drag and how quickly, from small pieces left in the drain, the weed will develop and again stop the flow and raise the water-level.

The apparatus illustrated is both rapid and effective for cleaning out this weed, and possibly others of a similar nature. Several old scythe blades with the shanks removed are loosely bolted together end to end to give a flexible blade about the width of the drain or stream. To either end a suitable weight is attached to keep the blade on the bottom of the drain—window-sash weights are quite suitable. Short lengths of chain and sufficient rope to reach to the top of the bank on either side are also attached.

In operation the blade is lowered to the bottom of the stream and, with one man slightly in advance of the other on the opposite bank, the implement is worked to and fro across the bottom of the drain with a sawing motion as the operators move upstream.

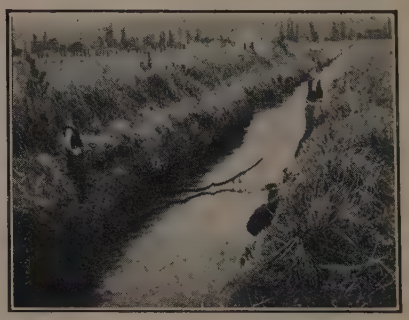

**Fig. 2.—The relative positions taken up by two men before lowering the blade into the water and starting the drag.**

As it is freed from the bottom and sides the weed can be cut off in sections with an upward cut of the implement and allowed to float away clear of the drain.

*—R. P. Hill, Instructor in Agriculture, Hastings.*


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# Eliminating Mud from Gateways.

BEING a very busy man, the farmer is apt to overlook some of the obvious requirements for a well and economically run farm. A condition which the average farmer takes for granted as part of the game is mud, but this to a large extent can be overcome by the expenditure of a little time, and the advantages accruing are obvious.

A sight only too common during the wet weather are gateways which require much vigilance and energy on the part of the stock to negotiate. Udders trailing in mud are not helpful in producing high-grade cream nor in combating disease, to say nothing of foot complaints. Figure 1 illustrates such a gateway.

Not to mention efficiency, nothing looks better on a farm than well-maintained gateways with good gates. Not only do they give the farm a good, well-kept appearance, but they are necessary to run the farm economically and to handle stock efficiently. Figures 2 and 3 illustrate gateways which require very little maintenance and show a marked contrast to the primitive method adopted in Fig. 1.

On many farms it is difficult and costly to secure suitable material to keep gateways in good order, but on the majority it is possible to obtain material of some sort to prevent gateways from becoming quagmires.

Obviously metal is the best material for this purpose, as shown in Figs. 2 and 3. Where metal is costly and difficult to obtain, material such as sandstone is often available, and, failing this, a filling of fascines will give a great improvement.

**Fig. 1.—A common sight on many dairy-farms: A neglected gateway with a primitive makeshift gate, an undesirable type.**

On most dairy-farms cows will be beginning to come in next month. This will mean heavy traffic through gateways, and if they have not been attended to they will soon be cut up. With the wet weather experienced throughout the winter and with that which can be expected during the next few months gateways as illustrated in Fig. 1 will become practically impassable and dangerous to the well-being of the herd.

It is a most important job during the autumn months to attend to all farm gateways so that they will stand up to the traffic of stock during the wet periods of the year.

*—E. B. Glanville, Instructor in Agriculture, Whangarei.*

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A newsletter covering the issue of New Zealand standard specification for galvanized (zinc-coated) steel fencing-wire has been issued by the New Zealand Standards Institute. This newsletter is available free on application to the Institute, third floor, Hamilton Chambers, 201 Lambton Quay, Wellington.

**Fig. 2.—A distinct contrast from the primitive method shown in Fig. 1. The metal in gateway consists of small stones cleared from volcanic land.**

**Fig. 3.—Gateways of this description add to the appearance and efficient working of a farm.**

*[Photos by E. B. Glanville.*

# Horticultural Instruction.

## Contributed by Officers of the Horticultural Division.

## *Orchard Notes.*

## Pruning of Apple-trees.

MANY theories are put forward on the correct way to prune an apple-tree, all having the same object in view—the growing of a sturdy tree capable of carrying regular crops of high-class fruit over a long period of years. Many different styles of pruning have been in vogue during the past few years. Probably a modification or combination of the methods put forward would produce the class of tree for which all orchardists are looking.

Whatever system is adopted, there are some principles which must be kept in view. Each tree presents a different problem and should be studied carefully before any pruning is done. For instance, if the growth made for the previous season has been small the pruning will be quite different from that used where heavy, strong growth has been made.

It must be remembered that there is a close relationship between growth and fruiting, and that fruiting generally decreases with heavy and excessive growth and increases as the tree settles down to a sturdy average growth. Therefore, an effort should be made to produce a good balance between growth and fruit, to maintain good fruiting wood throughout the tree, and at the same time to show a fair average growth.

### Vigour of the Tree.

The vigour of the tree depends upon its leaf surface, the foliage acting as the lungs of the tree. Consequently, it is imperative that pruning should be done to provide and maintain an adequate supply of large, healthy foliage, without which neither good growth nor fruit can be obtained.

Strong, upright growths in a tree have a tendency to produce wood to the detriment of fruiting, and, although these growths are necessary when forming the tree, when they are once established attention should be given to producing growth in a more or less horizontal position, at which stage growth will be somewhat checked and fruiting increased.

In spite of the fact that all care has been taken and the main principles adopted, some trees will not respond to treatment and will fail to make growth. In such cases the rooting system may be at fault, and, as no fruit-tree can flourish unless there is co-ordination between top and root, these trees would be better removed and others planted in their place. This refers mainly to some of our spur-bearing varieties, especially when settling down to fruiting.

On the other hand, some trees produce heavy growth every year, while the production of fruit is small. As hard cutting usually produces growth it is well to modify the pruning in such cases, leaving many of the longer laterals intact and growing in a horizontal direction. Either of these extremes may be avoided by judicious pruning from the time the tree is planted, the main object being to provide a tree having an equal balance of both growth and fruit.

### Permanent and Temporary Wood.

The difference between permanent and temporary wood in a fruit-tree should be noted and the tree pruned accordingly. When a young apple-tree is planted the first consideration must be given to the permanent wood, or that wood which is to remain in the tree for good, which consists of the trunk, leaders, or main branches, and sub-leaders, or heavy fruiting branches coming from the leaders. The temporary wood, or that wood which is often depleted or renewed to make room for further temporary wood, consists of laterals of all sizes and fruit spurs.

This temporary wood cannot be provided successfully unless the permanent wood is first established. The first aim of the pruner, therefore, should be to build up the permanent parts—that is, trunk, leaders, and fruiting branches—so that when the time arrives for the temporary wood to start work the tree will be sturdy and capable of bearing any strain that might be caused in the carrying of the crop.

While it is very pleasant to see a young tree carrying fruit, it often results in a stunted tree with little or no vigour when the tree should be coming into full bearing. Some varieties are much weaker in growth than others, but no variety, irrespective of strength, should be allowed to bear fruit until the permanent wood is well established.

### Number of Leaders Required.

When planting a young apple-tree it is well to consider the number of leaders, &c., required in the full-grown tree. This will be influenced somewhat by the district and the class of soil in which the tree is planted. The old method of training a tree to carry from twelve to sixteen leaders has been modified very considerably during the past few years, in many cases the reduction being as low as three or four.

While this may be going to the extreme, results to date from the modified leader system are good, and there is every reason to believe that many more growers

vill adopt it in the future. It is claimed hat by this system more space is available etween the leaders for the development f fruiting wood, that better quality fruit s produced, and that the trees carry ust as much fruit as with the larger umber of leaders.

The aim when pruning young trees is o produce a strongly formed tree with ve or six leaders spaced as equally as ossible. The centre of the tree should e kept open and the leaders more or less rect to maintain growth and enable them o carry the weight of fruit in future ears. If spaced properly there will be ufficient room between the different eaders for the development of fruiting rms and laterals. As the tree advances, ruiting arms should be encouraged to row from the leaders, growing as far as ossible in a horizontal direction. Along hese arms are borne the laterals and purs on which the fruit is carried. If ossible, aim to produce the fruit on the utside of the tree, and thus obtain the naximum amount of sunshine.

### Laterals and Fruit Spurs.

By this time the permanent parts of the ree should be well established, and atten- ion must be given to the temporary parts. aterals and fruit spurs will appear all long the fruiting arms. In fact, such a uantity will be produced that it will be ecessary to remove some altogether to revent overcrowding. These laterals nd spurs are the parts that produce uit. In the past it has been the usual ractice to shorten back these laterals very year, but under the method now dopted the laterals are left uncut to roduce fruit.

It will possibly be found that there are any more laterals than are required for uit-production in any one year. Those ot required should be removed entirely o make room for further laterals in the ture. Laterals and fruit spurs, as they ecome old and worn out and thus pro- uce only inferior fruit, should be cut out ntirely. This system of pruning is a eries of replacements of the temporary ood, a percentage being cut out every ear to make room for new developments the future and to ensure a good supply fruiting wood year after year.

To maintain growth and vigour it will e necessary to treat the leaders lightly very year. Difficulty may be experi- nced with some varieties, especially if ealing with a fully matured tree, but a gradual process of elimination good sults will be obtained in a comparatively ort time. Nevertheless, it should be membered that whatever system of uning is adopted no fruit-tree should expected to bear heavy crops of good uit over a long period of years unless ell supplied with the necessary plant- od.

**A three-year-old Jonathan, showing strong growth and the upright form that is so desirable with this variety. On right: Pruned. The long bearing laterals have been shortened somewhat, and the short ones left to fruit in either the coming or the following season, as the case may be.**

### Condition of the Soil.

Providing the soil is in suitable condition, planting can be done during the present month. If the soil is too wet the operation is better delayed until the spring, when the soil is drier and warm. The main object when planting is to ensure that the trees establish themselves as quickly as possible, and unless the soil is in a suitable condition this cannot be done. When planting, all bruised and broken roots should be removed, a sufficiently large and deep hole should be dug (but not deeper than the depth of the worked soil adjacent to the hole) to accommodate the roots when spread out, and a light dressing of manure should be incorporated in the soil around the newly planted tree. Prune the young tree before planting, having in mind the class of tree it is intended to grow.

Growers having fruit in store, either cool or ordinary, will be well advised to make frequent examinations. The past season has not been too favourable for keeping-qualities of apples, and rots may be expected to set in at any time. Much good fruit is often wasted through neglect in this respect. When repacking from the store, care should be taken to see that only sound fruit goes to market, and that the necessary details under the Local Market Regulations are correctly placed on the cases.

### Ploughing of the Orchard.

The ploughing of the orchard, where not already done, should be undertaken as quickly as possible to enable the soil to receive the benefits derived from frost and rain during the winter months. All green crops should be turned under to allow for complete rotting before the spring operations commence.

This is also an opportune time to attend to any drainage required in the orchard. Attention to this matter pays handsomely, and is often the means of producing heavier crops of fruit, as no tree can stand against "wet feet" for any length of time.

The overhaul of the spraying outfit in preparation for next season's operations could easily occupy any wet days that occur during the month. Breakages during the past season should be remedied and the renewal of worn out parts attended to. In fact, everything should be done to save unnecessary delay when the spraying season begins.

*—George Stratford, Orchard Instructor, Motueka.*

## *Citrus Culture.*

# Production of the Fruit.

FACTORS which tend towards success in citrus culture are many and varied, and it is only by giving adequate attention to all such matters that the best results are secured. These factors may be briefly summarized as follows:—

(1) Control of pests and diseases.

(2) Development and maintenance of healthy trees.

(3) The utmost care in handling the crop.

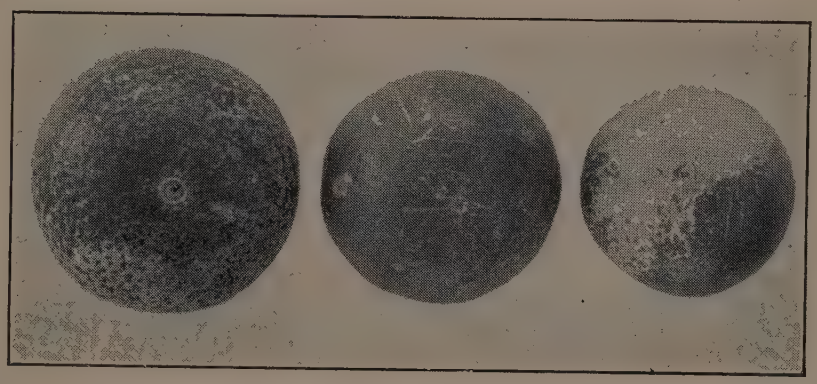
(4) The production of fruit of good quality, size, and appearance.

The first three factors are more or less understood by growers and are given, in some measure, the necessary attention. The quality, size, and appearance of lemons is, however, inclined to be comparatively neglected by some growers. Trees that regularly produce a large percentage of inferior-quality fruit are unprofitable and should be worked over at the first opportunity with buds taken from suitable trees.

Tree-ripened lemons are not of the best quality, and consequently fruit should be picked not later than the stage at which it has assumed a silver-green colour. The temptation to allow undersized fruit to become tree-ripened to secure additional size should invariably be resisted, for it is preferable to produce a small lemon of good quality than a slightly larger inferior-quality tree-ripened fruit.

### Regulating the Size.

The maximum size of lemons is readily regulated by picking as soon as the desired size is obtained. The percentage of undersized fruit can be reduced to a minimum, if not entirely eliminated, by adequate manuring, cultivation, and pruning. Under average orchard conditions insufficient pruning is probably responsible for a large percentage of the small fruit.



**Three fruits illustrating points dealt with in this article—the largest shows severe leaf rubbing; the medium, thorn scratches; and the smallest, branch rub.**

While the prevalence of diseases and insect pests influences the appearance of fruit in no small measure, these are by no means the only factors which cause the fruit to be blemished. Such disfigurements as are caused by thrips, verrucosis, grey-scab, and sooty-mould fungus are readily avoided by a suitable spray programme.

Injuries caused by branch-rub, thorn scratches, and leaf-rub—the last-mentioned being sometimes erroneously attributed to thrip injury—can be reduced to a negligible percentage by suitable and adequate pruning and by providing adequate shelter from wind. Green spots on cured lemons are found only on fruits that have been picked when green in colour, and are due to the fruit becoming bruised prior to colouring.

It is the quantity of "Extra Fancy" and "Fancy" grade fruit that mainly determines the amount of profit to be derived. Therefore, orchards producing a heavy crop with a high percentage of low-grade and small-sized fruit can be expected to show a smaller profit than a relatively lighter crop showing a high percentage of the two best grades.

### New Plantings.

Trees required for new plantings or replacements should be ordered from a reliable nurseryman immediately, if this has not already been done. Only first-grade trees should be planted, and these should have the lowest main branch not less than 2 ft. from ground-level.

In many of the older orchards there are trees which, from one cause or another, have reached an unprofitable stage. The grower must determine whether such trees can be brought back into a profitable state by severe pruning and by soil improvement, or whether the tree should be removed without further delay. A young tree can be immediately planted on the old site, provided a large hole is dug and filled with fresh soil.

### Picking.

The rule of picking lemons according to size, irrespective of colour, should not apply to sweet oranges and grapefruit. For dessert purposes these should be left on the trees for a considerable period after they have become fully coloured to allow the juice to become fully sweetened.

The practice of picking New Zealand grapefruit for dessert use as soon as fully coloured is not desirable, for it tends to mitigate the popularity of this variety as a breakfast fruit. No doubt there is a limited demand for immature grapefruit, but all packages of such fruit should be clearly marked "For Marmalade" or other synonymous wording.

**Brown-rot.**

Attention is again drawn to the danger of this disease. Infection this season has been observed in certain districts about three weeks earlier than in an average season, and consequently a second and even a third application of Bordeaux mixture 3–4–50 will probably prove necessary in most areas to prevent infection for the remainder of the winter and spring months. Thoroughness of application is an important factor in the control of this disease.

*—Percy Everett, Orchard Instructor, Gisborne.*

## *Viticulture.*

# Pruning in Outdoor Viticulture.

WHEN mastered, a number of principles which have been established through centuries of practice enable the vinegrower to avoid any serious errors. While some of these can be applied to most of our fruit-trees, others are peculiar to the vine.

The natural habit of the grape-vine is to run over the ground and up trees, rocks, or any support it can find to help it climb towards the sun, for sunshine is essential to its life and development. New wood is continually being formed in the process of climbing, while old wood which no longer serves its purpose dies out and leaves bare trunks, like those of the vines we see in our native bush.

The fruit of the vine is borne on shoots of the season, which, in their turn, grow on the wood of the previous season. Water-shoots, as new growth arising from old wood are called, rarely produce fruit, but they are sometimes useful, if suitably placed, for forming spurs for the production of fruiting rods.

The object of pruning the vine is to confine it within certain limits in order to facilitate its culture while obtaining a maximum of the highest-quality fruit.

**Methods of Pruning.**

There are two general methods of pruning—spur pruning and rod pruning, or short and long pruning. A spur usually carries one or two buds and a base bud. A rod is longer, and may be as long as the vine can support. In New Zealand a combination of these two methods, known as the double Guyot system, or rod and spur system, has been found to give the best results with most varieties of outdoor vines.

This mixed method consists of growing two new fruiting rods each year. While these rods are bearing, two other rods are being grown from spurs placed as near to the main stem as possible to take their place the following season. After fruiting, these rods are cut back in the winter to form spurs on which other replacement rods will be grown, or they are cut out entirely if not required.

The principal pruning of the vine is done while the plant is dormant—between the fall of the leaves at the beginning of the winter and the rise of the sap in spring. In large vineyards the pruning may be spread over most of this period; smaller vineyards whenever it is most convenient.

**Time for Pruning.**

In deciding on the best time for pruning we must consider the convenience of other cultural operations and the effect of the period on the health and bearing of the vine.

For convenience the earlier the pruning is done the better. Pruning in June gives abundant time to gather and burn the prunings, to tie up the rods, to apply fertilizers, and to cultivate the soil before the buds start. The effects of the time of pruning on the vigour and fruitfulness of the vine bear a close relation to the location and amount of reserve food material in the various parts of the plant.

During the summer the leaves feed the canes, trunk, and roots. Just before the natural fall of the leaves the canes contain the maximum amount of food material—namely, starch, sugar, cellulose, and other carbohydrates. If we prune a vine immediately after the fall of the leaves the cuttings contain the largest amount of reserves and are in the best condition for use as scions in grafting or for planting in the nursery.

Three or four weeks later the roots contain the largest amount of reserves, and, if pruning is done then, they will be in the best condition to promote a vigorous growth in the spring. When the buds start in the spring the roots have lost some of their reserves, which have been used up by the canes. Pruning at this time, therefore, results in a less vigorous growth of shoots but usually in a better "setting" of the crop.

**Results of Experiments.**

Professor Ravaz, a well-known French authority on viticulture, informs us that in a series of experiments extending over seven years it was found that: (1) Vines pruned immediately after the fall of the leaves are the earliest to start in the spring; (2) those pruned in mid-winter start four or five days later, and those pruned when the vines begin to bleed start about six days later. It was also found that pruning when the terminal buds begin to swell retards the lower buds eleven days, and, when the terminal buds had grown 2 in. or 3 in., twenty days. All of which goes to prove that the later pruning is performed the later the buds will break.

One exception, however, was noticed. Vines pruned soon after the vintage and while still covered with green leaves started, on the average, ten days later than those pruned after the fall of the leaves. The retarding of the starting of the shoots in the spring is a valuable means of escaping the injurious effects of spring frosts in certain districts.

**Importance of Leaves.**

The food material which goes to build up the body of the vine and of its crop are elaborated in the leaves by means of a green substance known as chlorophyll under the influence of sunlight. The carbonic acid of the air and the water from the soil furnish the main bulk, while the mineral salts from the soil furnish a smaller but equally necessary part.

A certain area of green leaf surface functioning for a certain time is absolutely necessary to produce sufficient nourishment for the vital needs of the vine and for the production of the crop. Those leaves which are the most exposed to the direct action of the sun are the most active in absorbing and producing the food. The youngest leaves take all their nourishment from the older parts of

the plant, and somewhat older leaves obtain part of their food from the same source.

Later, the leaves reach a stage where they produce more food material than they can utilize in their own development, and the excess then goes to support other parts of the vine. The most important food-producing organs of the vine and its fruit are therefore the mature dark-green leaves—a very important point to remember.

Any method which forces an unnecessary growth of young shoots or removes mature leaves while they are still active limits the possibilities of production, and, if carried too far, may result in starvation of the vine.

### Tendency to Fruitfulness.

Within certain limits, the tendency to fruitfulness of a vine or part of a vine is inversely proportionate to its vegetative vigour. Within these limits, methods which increase the vegetative vigour diminish bearing, and, *vice versa*, methods which diminish vigour increase bearing. Failure to take into account this fact and to maintain a proper mean between the two extremes lead on the one hand to comparative sterility, and on the other to over-bearing and premature exhaustion of the vine.

The correct treatment of a vine is that which invigorates it as much as possible without diminishing the crop. Other conditions being equal, an excess of foliage is accompanied by a small amount of fruit, and excess of fruit by diminished foliage. The more crop a vine bears in one year the less growth it can make in the same year, and *vice versa*.

This last statement indicates that growth and bearing vary inversely, but this is only true within somewhat narrow limits, for, if the crop is reduced to zero we get maximum growth, but if we reduce the growth to zero the crop disappears also.

### Reducing the Shoots.

The vine, following its natural habit, tends to force out terminal buds and to expend most of its energy on the shoots farthest from the trunk. To keep the vine within practical limits, this tendency must be controlled by reducing the shoots at the ends of the rods so as to force the growths placed nearer to the base of the rods.

The nearer a shoot or cane approaches a vertical position the more vigorous it will be. This principle is used in the Guyot, or rod and spur, system, in which a new fruiting rod is laid down every year. Shoots for that purpose growing from the renewal spurs near the main stem are trained vertically up to and then along the top wire of the trellis.

The trellis system of training in general use in New Zealand permits of this principle being applied, and, by exposing the young growing shoots to the sun, ensures an annual supply of vigorous rods for replacement purposes.

The fruit canes are grown horizontally along the bottom wires, thus moderating the vigour and increasing fruitfulness. Each year the vine bears a crop and develops the buds which produce the crop and growth of the following year. The condition of a vine at the end of a year determines how much crop it can bear and how much growth it can make the next year.

### Utilizing the Vigour.

We must leave enough fruit-buds on a normal vine at the winter pruning to enable it to bear a good crop the following year and still have surplus strength to produce enough vigorous mature buds for the next crop.

Whether we have succeeded in our object will be determined at the pruning of the following winter. If the vine has gained in size and vigour we have not utilized its bearing-capacity fully, and the number of fruit-buds left should be increased. If it appears weak it has been overtaxed, and the number should be decreased. In this way the vigour of the strong vines is utilized to obtain larger crops, and the weak vines fortified so that they will give larger crops the following year.

The fewer vines that are grown to the acre the larger each will grow; the fewer shoots allowed to grow on a vine the larger the individual shoot becomes. This principle also extends to the fruit. If we want large bunches we must limit their number, and if we want large berries there must not be too many on a bunch.

### Marketing the Fruit.

In marketing table fruit, size and quality count for everything. The consumer buys very largely through the eye, so that the fruit of good size and appearance is that which sells best. Inferior fruit is difficult to sell at any time.

In developing the maximum quality, good pruning plays a very important part, as it assures that under normal conditions each bunch will be brought to perfection. By balancing the vine, fruit will not be obtained at the expense of growth.

The development of the fruit is inversely proportionate to the size of the shoot which bears it. This also has its limitations, for, while very strong shoots fail to carry fruit of the finest quality, too weak a shoot is incapable of nourishing it. Good average growth is the best fruit-producer. The vine is a plant which remains productive over a long period, and pruning with a due regard to the principles mentioned will serve to the maintenance of health, vigour, and fruit-bearing over the greatest number of years.

Pruning vines under glass is dealt with in Bulletin No. 102, 1937 edition, which may be obtained free from the publisher, Department of Agriculture, Wellington, or from any local office of the Department.

*—J. C. Woodfin, Vine and Wine Instructor, Te Kauwhata*

## *Tobacco Notes.*

# Grading of the Leaf.

ALL tobacco-growers are now busy in their grading-sheds preparing the leaf for market, and grading and prices are the current topics of conversation.

Most of the tobacco produced in the Motueka district is grown under contract by various growers with the tobacco-manufacturing firms, Messrs. W. D. and H. O. Wills (N.Z.), Wellington; the National Tobacco Co., Napier; the Nelson Tobacco Co., Nelson; Wakefield Tobacco Co., Auckland; and the General Tobacco Co., Christchurch. These are all using Nelson-grown tobaccos.

This month I will confine my remarks to the grading of tobacco for the export market, London. For the past three years tobacco has been exported to London and sold at prices satisfactory to the growers. The grading has given satisfaction to the brokers (Messrs. Andrew

Chalmers and Co.) and to the purchaser, who is one of the three largest manufacturers in Britain.

### Separating into Classes.

Export or Government grades for tobacco have been arranged to provide the most simple method of separating a crop of tobacco-leaves into classes uniformly, so that the purchaser will know what to expect in each package of that grade mark. It is understood that the manufacturer will re-sort each grade again into several lots to suit the requirements of his trade. Our work is to see that each grade is the same year after year.

The only tobacco exported under the Government guarantee is flue-cured bright leaf. This is separated according to colour: No. 1, lemon; No. 2, yellow; No. 3, orange; No. 4, mottled. These numerical grades are divided into three subgrades alphabetically—A, B, and C. "A" represents perfect leaf, "B" leaf with 5 per cent. of surface damage (stain or tear), and "C" the same class of leaf but with 15 per cent. to 20 per cent. of blemish. Thus, a case marked "2B" would contain yellow leaf with 5 per cent. blemish. Another marked "3A" would contain orange-coloured leaf free of blemish, and would probably fetch more money than "2B."

It has been found after careful laboratory tests covering eight years that the colour represents the body or texture of the leaf. This is so in 95 per cent. of the yellows and oranges and 90 per cent. of the lemons and mottled. The reason is that with a kiln of tobacco filled with the same variety of leaf grown on the same land the heavier, fleshier leaves responded more slowly to the rising temperatures in the curing process, with a resultant darker colour in the finished article.

### Use of the Chart.

In 1933 a chart was prepared setting out the uniformity of colour to texture. This has been checked annually, and there is no appreciable difference to record. The procedure is to take leaves containing 12 per cent. moisture, to cut out disks from the web, avoiding stem and veins, with a No. 12 gauge gun-wad punch, and to weigh these on a chemist's scales with a 10 grain weight. New Zealand tobacco will range from 32 to 10 of these disks to the 10 grain weight. Fine-textured leaf is classed from 32 to 24, medium-textured leaf 24 to 18, and heavy bodied leaf from 18 to 10. Copy of chart is set out above.

This chart has been used by the export graders during the past three years in Motueka, and all have become used to the method. Government export grades are very simple to operate.

Possibly there are improvements that can be suggested, but it should be borne in mind that London has accepted these grades for three years, and also the Motueka graders have become proficient in handling them.

Most seasonal work in the fields is now completed. Many areas are ploughed and cleaned up in preparation for next season, and motor-lorries are carrying loads of tobacco from the plantations to the manufacturer's receiving-sheds and to the wharf.

The exporters began receiving leaf at Buxton's Depot, King Edward Street, Motueka, on the 1st June, and the new Government export tobacco bond store should be ready to operate the Proctor reconditioning-plant at the end of June.

—*Charles Lowe, Tobacco Instructor, Motueka.*

### *Chart of Government Export Tobacco Grades.*

| Number of Disks (⅞in. Diameter.) | Texture. | | Colour. | Grade. | |
|---|---|---|---|---|---|
| 31 | Fine texture | Very fine | Lemon | Grade 1 | A: Perfect leaf. |
| 30 | | | | | |
| 29 | | Usual Average Leaf | | | B: 5 per cent. surface blemish. |
| 28 | | | | | |
| 27 | | | | | C: 20 per cent. blemish. |
| 26 | | | Yellow | Grade 2 | A: Perfect. |
| 25 | | | | | |
| 24 | Medium | | | | B: 5 per cent. |
| 23 | | | | | |
| 22 | | | | | C: 20 per cent. blemish. |
| 21 | | | | | |
| 20 | | | Orange | Grade 3 | A: Perfect |
| 19 | | | | | B: 5 per cent. |
| 18 | Heavy body | | | | |
| 17 | | | | | |
| 16 | | | | | C: 20 per cent. |
| 15 | | | | | |
| 14 | | | Mottled | Grade 4 | A: Whole leaf sponged. |
| 13 | | | | | |
| 12 | | | | | B: Broken, 5 per cent. hail-mottled, and discards greenish. |
| 11 | | | | | |
| 10 | | | | | |
| | | Very heavy | | | C: Mottled; lowest export; broken; 20 per cent. blemish. |

Tobacco grown on average good land will average colour and texture as shown. Regarding the elasticity of the leaf, a strip of leaf 2 in. wide folded in four should stretch from 5 in. to 5¾ in.

# Vegetables, Small Fruits, and Flowers.

## Contributed by the Horticultural Division.

## Keeping the Fertility of the Soil.

THE chief business of the farmer and homestead gardener is to keep his land clean and in a fertile state suitable for the crops grown, and to do it economically. Neglect or wrong treatment may cause damage that is repaired only after many seasons.

Where the land is fair to heavy much damage is often done by working it when it is wet. When planting or sowing is to be done it is hard to pass a suitable period on account of the land being wet, but it is better to plant late than to clod the land or get it into a state that forms a surface crust over seed-beds.

During winter and spring, when dry conditions are comparatively rare, they should be closely watched and full advantage taken of them as they occur, as it is especially important to make an early start with ploughing and trenching. Where land of this type is under intensive cultivation it will generally be best carefully to work out and install a thorough system of drainage.

### Use of Lime.

Under present conditions the use of lime demands more consideration in many districts. Some crops make a marked response when lime is applied to an acid soil. Most responsive are cabbage, cauliflower, broccoli, mustard, asparagus, beet, celery, leeks, lettuce, onions, parsnips, egg-plant, peppers, musk melons, salsify, and spinach. Less responsive are carrots, cucumbers, kale, peas, pumpkin, marrows, and rhubarb. Showing no response are kidney-beans, sweet corn, parsley, potato, radish, tomato, turnip, and water-melon.

Applications of lime are most effective to produce and maintain that friable condition so necessary when sowing fine seeds or to obtain the best results from a soil with a crop of any kind. Again, to obtain the best results from the use of such fertilizers as superphosphate and sulphate of ammonia there must be a sufficient supply of lime in the soil to enable the necessary reactions to take place.

Applications of lime are effective for the prevention of club-root disease, the fungus which attacks plants of the cabbage family, if at the same time good drainage is provided. Used too liberally, lime has been proved to encourage the development of the disease known as potato-scab, and has reduced production in such crops as water-melons and blue lupin.

### Question of Application.

Lime (calcium) is found in nature as limestone (carbonate of lime). Broken up and ground to a fine powder, it is the class of lime commonly used in agriculture. Burnt lime has the carbon driven off, and is known as quicklime. It is lighter in weight, absorbs water readily, and then breaks down into a powder—a process known as slaking. Such lime is caustic and more aggressive in its action than the ground, raw limestone.

On heavy, clay loams of an acid character, when used for the intensive production of market garden crops, 4 oz. of finely ground carbonate of lime may be applied per square yard annually with advantage to the mechanical and chemical condition of the soil. This amount is equal to about ½ ton of lime per acre. When crops of the cabbage family, or others preferring an alkaline soil, are to be grown, the dressing may be increased substantially.

The action of the lime is temporary; what is not used up gradually leaches out and is carried away in the storm-water. Lime is usually broadcasted on the surface of the land after ploughing, and then harrowed in; or else applied after digging the ground, and cultivated in.

### Supply of Humus.

In many instances where intensive cropping is practised it is difficult to maintain the necessary supply of humus in the soil. The decaying organic matter which gives a fertile soil its dark colour and light absorbent character is known as humus, and there are few crops which may be grown satisfactorily without a generous supply of this material.

Crops which are required to make vigorous growth, such as cabbage, rhubarb, asparagus, &c., require a heavy dressing to be turned under before planting, but for root crops and such crops as tomatoes this treatment results in coarse, fibrous roots and rank, barren plants. They are therefore grown in succession to the former class, and do very well on what remains of the manures applied for the previous crop.

In the comparative absence of stable manure, upon which it was usual to rely chiefly, it is necessary to conserve what may be available in the way of farm and fowl manure, fallen leaves, and vegetation such as grass and weeds mown before seeding, by stacking it carefully in a compact heap to decay. Seaweed is excellent, when obtainable.

### Supplementary Supplies.

Supplies of this kind are sometimes supplemented by growing a green cover-crop of oats and horse-beans, barley and

vetches, lupins or mustard, &c., for turning under. Early preparation is desirable for heavy soils. Where soils are light, the disintegration of humus is more rapid, and preparation of the soil and planting may follow more closely. Because of the "hungry" nature of light land it is often advisable to sow it down in grass and graze it for three years after cropping it for a similar period.

In the absence of adequate supplies of humus a ½ ton per acre of blood-and-bone or fish-manure may be turned under. Other materials under this heading which are of great value are soot and wood ashes. As the nitrogen in the former and the potash in the latter are highly soluble, these materials must be stored in a dry place.

Modern conditions, which have greatly reduced the available supplies of manures, have also greatly improved the quality and supply of commercial fertilizers. Soil fertility is greatly enhanced by the timely application of suitable quantities of fertilizers. In the most convenient form they enable the adjustment of the balance of plant-foods in the land to the requirements of almost any crop, and they can be applied at any time as weather or other circumstances may make it necessary.

**Use of Fertilizers.**

Local experience and close consideration of all the circumstances are necessary to use these fertilizers with the greatest economy and success. Where the quantity applied is small it is often best if drilled along the line to be planted or sown alongside the seed-drill. Further applications are made as necessary by drilling it in alongside each row in the growing crop or broadcasting it down the alleys.

Where the rate of application is large, and especially where the crop rows are close, it is often advisable to broadcast the fertilizers and work them in a week or two before sowing or planting the crop. The tendency is to feed the crop heavily, in which case it is particularly important that the plant-foods should be well balanced.

The fertilizer which is too often underrated is potash. Its effect usually is less spectacular than that of nitrogen and phosphates, but it is nevertheless important. To the increased growth obtained by feeding nitrogen it maintains the firm texture and quality which is often otherwise lost, and the plant, because of the softness of its foliage and young vigorous growth, falls a victim to high winds or fungous diseases. This is especially liable to happen in a light, free soil.

**A shelter-belt of Lombardy poplar interplanted with privet.**

## *The Planting Season.*

With but three months to run before the end of the season, finality should be attained with any plans which are being made for taking advantage of the present planting season. In doing this one should avoid as far as possible extreme situations, and, in carefully selected localities, plant those trees and shrubs which are suited to the soil, climate, and object in view. Extreme situations are such conditions as a shallow soil overlying rock or a watertight "pan," where conditions alternate between extremes of moisture and drought or a light overdrained soil in a warm position.

Useful plants may be found suited to most conditions, but on the former most trees will soon become "stag-headed" and stunted, while on the latter the choice of suitable plants is confined to a comparatively small number which, while interesting, are of limited utility.

**Suitable Localities.**

Localities on the farm most suitable for planting trees and shrubs are the vicinity of the homestead, where shelter, shade, fruiting, and ornamental trees are required, shelter belts and hedges in exposed positions, and plantations on broken country or in isolated positions, where it is better to grow fence posts and stakes rather than cart them there. With good management these plantations will supply firewood as well as useful timber for the farm or for sale.

## *Shelter Trees and Hedges.*

On poor land deficient in humus and in high country or sandhills along the coast, species of pine are generally most suitable for shelter planting. *Pinus muricata*, the Bishop's pine of California, is of moderate height and well furnished with foliage about the base, and for that reason is often planted on the windward side of species developing bare trunks.

Under somewhat similar conditions, species of acacia grow into useful timber for firewood and posts.

Pines should be planted with caution on good land, as they are inclined to grow coarse and unwieldy. In such a situation cypress, such as *Cupressus Lawsoniana* and *C. torulosa*, associated with eucalypts, such as *Eucalyptus Macarthuri*, *E. viminalis*, and *E. fastigata*, are usually appropriate. The popular macrocarpa cypress is an excellent timber-tree, but only when it is of a strain which grows straight boles. If it is then planted in a plantation on alluvial soil of fair quality which is well drained good results may be expected.

Nevertheless, the ordinary strain provides good shade and shelter on warm slopes and is useful for the protection of stock, as, for instance, after shearing. In particularly dry districts, where the cypresses mentioned are not satisfactory, consideration might well be given to the species *Cupressus arizonica*, recently introduced at Canterbury Agricultural College. Information regarding this species will be found in the October issue of the *Journal*.

### Protection of Gardens.

For the protection of gardens and orchards the Lombardy poplar, interplanted with barberry or privet, often forms appropriate shelter, and requires little attention. For really stock-proof hedges there is at present nothing better than seedless barberry, a variety of *Berberis vulgaris*, and boxthorn, *Lycium horridum*. The latter is much prized in localities exposed to heavy salt-laden winds as long as the soil is light and well drained.

On poor land under pine trees, *Elaeagnus japonica* in many places makes a close shelter-hedge of great value on the windward side, but on better land its rank growth is a troublesome habit. Selections along these lines after considering local experience will give good results if the trees are carefully planned and planted with adequate protection until they are established, and they become valuable assets at a comparatively low cost.

## *Ornamental Trees and Shrubs.*

Successful planting under this heading depends very largely on selecting trees and shrubs suitable for the position they are to occupy. For good, well-sheltered land and moist slopes which are shaded for the greater part of the day there are a large number of plants from which to make a selection. In most gardens, however, there are important positions not so easily catered for.

In exposed positions subject to high winds the native evergreens, such as species of *Pittosporum*, *Olearia*, *Metrosideros*, *veronica*, and *Cordyline*, flourish. Moreover, it is there that they are healthiest and flourish best. These, and many other native plants, are admirably suited to the most exposed conditions as long as the land is fair to good and is usually well supplied with moisture.

### Exposure to the Sun.

On the sunny side of a shrubbery or plantation shrubs are often found suffering from the dry, hot conditions—laurustinus and rhododendrons with leaves dry and silvered through drought and the attack of insects. Such plants are, like the majority, suited to positions where they receive full sun for only a few hours in the morning or afternoon.

Plants which flourish best under the hot, dry conditions are species of acacia, *Callistemon*, and *Casuarina* from Australia; *Fremontia*, *Garrya*, *Ceanothus*, *Romneya* from California; the fragrant Spanish broom *Spartium junceum*, and also a variety of broom with flowers of many colours listed under the generic name of *Cytisus*; *Helianthemums* and *Cistus*, the sun roses and rock roses of Southern Europe; *Ceratostigma Willmottianum* from China; the brightly berried firethorns, *Pyracantha*; and *Pittosporum crassifolium*, *Metrosideros tomentosa*, and *Dodonea viscosa*, which are among the most useful of our native plants.

### Plants for Full-shade Situations.

Plants are unable to grow without light, but many are able to get along fairly well without sunshine. For situations in full shade a selection may be made from the following: Tree ferns, *Coprosma*, *Brachyglottis*, and *Macropiper* among our native plants; *Aucuba japonica*, the spotted laurel; *Euonymus japonica*, the spindle tree of Japan; *Fatsia japonica* (syn. *Aralia Sieboldii*), *Ligustrum*, *Osmanthus*, *Nandina*, *Kerria*, natives of Japan; hydrangea and fuchsia varieties; *Myrtus communis* and *M. Ungi*, *Symphoricarpus racemosus*, and *Ribes speciosum*.

The present season is very suitable for making additions and adjustments to plantations and hedges, and also to the garden and orchard on the farm. In the drier localities especially is early planting desirable.

*—Wm. C. Hyde, Horticulturist.*

## Fruit Control Board Elections.

BY the Fruit-export Control Board Election Regulations 1938, the regulations formerly in force dealing with the conduct of elections for producers' representatives on the New Zealand Fruit-export Control Board are revoked and fresh regulations substituted.

The new regulations re-enact the provisions of the revoked regulations, and in addition make special provision for a candidate for election to appoint a scrutineer for the purposes of an election and for the producers in the Otago Provincial District to have a voice in the election of a producers' representative on the Board for the Canterbury and Otago Provincial Districts.

This election will take place at the same time as the ordinary election of persons to fill vacancies occurring on the Board in August next.

## Cool Storage Notes.

METHODS of controlling Jonathan scald are usually necessary this month. If Jonathans have been held in a separate chamber and the temperature held at 38° for a few days, reduced to 36° for two weeks, and then reduced over several weeks to 33°, scald may be controlled. They should have been placed in storage immediately after picking. If scald has developed by early June these lines should be gradually marketed. The larger grades of apples should have been carefully placed in a convenient position in storage to allow for frequent inspection to avoid losses.

Because of the shortage of cool-storage space some growers have this year fitted the passages right to the doors to accommodate the quantity of fruit available for storage. When a chamber is filled to the doors it must be understood that very little atmosphere remains, as the space has been filled with fruit, which still requires a supply of fresh air to live.

Frequent changes with outside air are very necessary to obtain good results with cool storage under these conditions. Blowing out the chambers methodically three times each week for ten minutes is necessary. This will effectually keep down carbon-dioxide accumulation.

Growers who are still holding fruit in their orchards are advised to commence to market soon and continue until they have cleaned up, for by early August much of this fruit will not be in good marketable condition. Wilt and rots will cause loss and deterioration, and it will then be competing with the cool-stored fruit.

Because of the amount of fruit in storage and out this season the markets of New Zealand must be kept fully supplied to absorb the amount of fruit still in the country.

*—A. Powell, Cool Storage Officer, Wellington.*

# Work for the Month in the Apiary.

## Moving of Bees to New Location.

AT this season of the year bees may be moved to a new location with perfect safety, but if the work is left until spring, when the activities of the hive commence, the resultant loss of field-bees will be enormous. More especially should advantage be taken of the bees' dormant condition if the hives are to be moved short distances only. The colonies are numerically weaker, and there is usually little brood to become injured in transport.

When hives are situated for any length of time in one position the flying bees take full observation of every landmark, but as there are shorter periods of sunshine in the winter the flight of the bees is necessarily curtailed and they usually return at a much shorter distance from the hive. In addition, there are often periods of several days together during which they take no flight at all, and consequently they must renew their acquaintance with their surroundings when an opportunity for flight occurs.

Therefore if the hives are moved during a spell of bad weather the bees will take more readily to their new situation when a fine day comes. Any bee-shifting operations should be begun before the end of July.

**Fig. 2.—An apiary ready for the removal of honey, showing the manuka breakwind.**

*[Photo by H. Drake.*

### Securing the Bees.

To secure bees for transit over a short distance sufficient ventilation can be provided by tacking a piece of wire gauze over the hive-entrance. It is then only necessary to secure the bottom and roof, and, after making sure that there are no holes through which the bees can escape, the hive may be carried with safety.

**Fig. 1.—A well-sheltered apiary, showing the natural breakwind.**

*[Photo by H. Drake.*

The successful moving of bees over long distances calls for considerable preparation. All heavy combs should be secured, and only sufficient honey left in the hives to prevent the bees from starving during their journey. The most important factor is ventilation, and neglect of this matter leads, as a rule, to heavy losses when bees are being moved.

The constant vibration of any vehicle tends to disturb the cluster, and the excitement caused is sufficient to raise the temperature of the hive considerably, so that the bees are in danger of being suffocated and the brood scalded. These troubles can be avoided by the employment of wire screens.

### Frames Must be Secure.

First see that the frames are made as secure as possible by inserting two wedges between the side of the hive and the top of the end frames. This prevents from rocking during transit. The bottom-board should then be secured to the hive-body by means of crate-staples, driving one end of the staple into the hive-body and the other into the bottom-board. Usually six staples are sufficient.

The screens can be made by using narrow laths nailed together to form a frame of the same dimensions as the hive-body, and covering this with wire cloth, such as is used for making queen-cages. The screens must be securely fastened to the top of the hive and the entrance covered with wire cloth. By this means ample ventilation is provided to ensure the safe carriage of the bees during the winter months.

In these days of motor transport the work of moving bees over long distances is greatly minimized, and the beekeeper will be well advised to adopt this method if it can be obtained. In any case, the beekeeper who has occasion to move bees should not relax any effort to make the hives secure when moving to a new location.

### Condition of Hive Mats.

At intervals during the winter months the mats should be examined to note their condition. After heavy rain the mats are liable to become damp, and should be removed and dry ones substituted. To save delay a supply of dry mats should always be kept on hand.

As far as possible, do not disturb the colonies when making an examination, and especially avoid jarring the hives. The roof can be carefully lifted and the mat examined. If the latter has to be removed see that the smoker is handy in case the bees are troublesome, but do not use smoke unless the bees have to be driven down. Remove the wet mat as speedily as possible, replace it with a dry one, and cover the hive.

### Leaky Covers.

Damp mats usually point to defects in the covers, and it should be worth while to the beekeeper to remove these also. At all seasons the comfort of the bees should be one of the main considerations, and this factor cannot be ignored if successful wintering is to be expected.

The labour involved in keeping the hives watertight will repay their owner many times over and will prevent to a large extent the loss of heat generated by the bees. One should aim at reducing the waste of energy of the bees by maintaining the heat of the cluster at an even temperature during the unproductive season, and this will be impossible where leaky roofs are tolerated. Successful wintering is a high test of the beekeeper's capabilities.

### Permanent Shelter.

Now that the actual work of the apiary is off the beekeeper's hands for a while he may devote his attention to providing permanent shelter for the hives. If he has definitely decided on a permanent location for the apiary he should now set about the cultivation of a quick-growing hedge. This matter is a most important one, and ranks next to that of locality.

It is noticeable in sheltered situations that the bees are able to take cleansing flights during the mild days of winter, whereas bees in unsheltered positions are often confined to their hives even on sunny days. An occasional flight in the winter is as necessary for the welfare of the bees as any provisions the beekeeper can make for their comfort. In addition to protecting the bees during the winter from stormy winds it is an incentive to increased brood-rearing in the spring and early summer.

### Thick Planting Advisable.

Whatever shrubs or trees are provided for the purpose of producing a permanent hedge should be planted thickly and trimmed to produce abundant foliage, especially at the base. It is highly important that the plants shall stand cutting back so that the hedge can be kept at a reasonable height. Hedges grown to a height of 8 ft. to 10 ft. and no higher, will provide ample shelter for a large apiary. There will also be less trouble in taking swarms if the trees are kept to the height indicated.

Locality and situation must to a large extent influence the beekeeper in choosing the most suitable plants, but, whatever the hedge, the idea should be to form thick shelter and not a plantation.

*—E. A. Earp, Senior Apiary Instructor.*

# Nectar-producing Flora in North Auckland Districts.

WHEN the first honey-bees were landed in New Zealand by the early missionaries they were located at Hokianga, in the North Auckland district. From there they gradually spread southward, increasing rapidly.

In those days there was little or no clover in the colony, and the bees for many years depended solely on the native bush flora for their food-supplies, the honey in those days being mostly dark in colour and sometimes rather strong in flavour. The principal source of supply was from tea-tree (*Leptospermum*), commonly known as "ti-tree," and in the south as "manuka."

### Main Source of Nectar.

North of Auckland this great honey-yielding scrub is still the main source of the supply of nectar, but lately, as the bush and scrub is being eradicated and the farms brought into pasture, the white clover is rapidly increasing, and there is now a considerable quantity of clover-mixture honey produced, so that many tons of good, light, amber honey is being gathered by the bees where a few years ago nothing but dark honey was obtainable. This is noticeably so in parts of the Whangarei County, and also in a lesser degree in other parts farther north.

Tea-tree honey grades usually as medium amber in colour. When unmixed with other bush nectar its flavour, although pronounced, is pleasing and rich, and generally preferred, once the consumer becomes accustomed to it, to that of the milder and lighter coloured honeys, such as clover.

### Difficult to Extract.

The viscid nature of tea-tree honey makes it very difficult to extract by ordinary methods, and this disadvantage has no doubt been the cause of most commercial beekeepers preferring to farm in clover-producing districts. In past years the method of separating this class of honey was by breaking up the combs and pressing out the honey. This method involved the destroying of the combs, which was a great waste, as the extra beeswax obtained was not sufficient to compensate for the loss of the combs.

After the press method came the honey-melter, but here again the combs were destroyed, and the heating did not improve the flavour of the honey. The method now adopted is to use the "pricker," which enables about half the honey to be extracted, the combs then being returned to the hives for a few days. A further extracting will remove more honey, but it is a messy job and far from satisfactory.

Sometimes, even when separated from the combs, the honey is so dense that it is impossible to strain it to remove all the pollen, &c. If some satisfactory method could be devised of extracting and straining this class of honey there would be a great future for profitable beekeeping in tea-tree districts, for such huge quantities could be gathered in North Auckland that it would show good profits to the beekeeper.

### Used for Winter Stores.

The present tendency among commercial beekeepers is to have some apiaries in clover districts and to extract bare, replacing the combs of tea-tree honey for winter stores. Tea-tree honey usually has a fair specific gravity, ranging from 1·42 to 1·425. It is rather slow to granulate, and requires a good starter to insure a fine grain.

During the past season large quantities of white-clover honey were gathered in the north. Possibly never before has the honey generally been so light in colour, and as the years go on it should gradually increase in proportion to the darker honeys. At present in the north it is not possible to get it absolutely pure, so that the best gathered is of a light amber colour and not water-white, as is some of the southern clover honey.

### Nectar from Pohutukawa Trees.

The next in importance is that from the pohutukawa trees. Honey from this source is water-white in colour and extracts very easily. The pohutukawa (*Metrosideros tomentosa*) grows on the sea-coasts of the North Island. It is commonly called the "Christmas tree," for it usually flowers a few days before Christmas. The flowering-period is not a long one, for the flowers last only about a week on individual trees. As the different trees vary somewhat in the time of blossoming, however, the period of blossoming in places where there are a number of trees is prolonged from a fortnight to nearly three weeks.

In the early days our bays and harbours were lined with this handsome tree, but unfortunately the timber was found so serviceable for boat-building that much of it was destroyed. However, local bodies are now planting it in many places, as also are private individuals, so that in many places around Auckland the bees are able to gather a large quantity of this delicious honey. Rangitoto Island is literally covered with these trees, and the few hives on this island often produce up to 200 lb. per colony. This honey has an aromatic flavour, and when once the taste for it has been acquired is considered by many to be one of the finest honeys in the world.

### Granulates Quickly.

It granulates very quickly; in some seasons it will start to granulate within twenty-four hours of extracting. In such cases it is usually of a very fine grain. If, as is sometimes the case, it takes a week or two to set, the grains are very coarse. As it frequently granulates in the combs if left on the hive, it is unsuitable for winter stores, and experienced beekeepers now extract every ounce possible, giving back tea-tree honey for winter stores. The specific gravity of this class of honey, when ripe, usually runs about 1·422.

There are many honey-yielding plants and trees in the Auckland Province. Among the native trees that yield honey are the veronica (Koromiko) and the rewa-rewa (*Knightia excelsa*). This yields a dark honey which is much milder than its colour would lead one to expect. The New Zealand cabbage-tree (*Cordyline australis*) yields in the spring, flowering profusely every second year, but the nectar gathered is not as a rule stored but is used up by the bees in brood-rearing.

There are also the different varieties of rata, of which some are very similar to the pohutukawa, the honey being much the same from some varieties. Many of our native trees yield large quantities of pollen but little honey, such as the totara. Among other bush trees yielding honey are the tawai, or whera-whera (*Astlea banksii*). This grows somewhat like a flax-bush, but in forks of large trees. Its honey is of poor quality.

### Fuchsia and Kowhai.

The fuchsia yields both honey and pollen, and flowers in September, but like many of our other native trees, yields only in the spring, so that little is stored. The kowhai is another of the native trees which helps to build up the bees in the early spring months. Among the introduced trees and plants which yield honey are the willow, hawthorn, and many varieties of the eucalyptus family.

The crimson flowering gum (*E. fiafolia*) is a great yielder of honey, and the planting of this handsome tree should be encouraged. It yields nectar at a time when most needed, just as the pohutukawa and clovers begin to go off. Its proper flowering-period is from January to February, but it sometimes flowers in Auckland quite out of season in the winter months, in such cases flowering twice a year.

Although so many of our native trees yield nectar, bee-keepers do not care to have their apiaries too near heavy bush and prefer to select clover or pohutukawa districts, but a little bush or tea-tree is very helpful in building up the apiaries in the spring and ensuring an ample supply of winter stores.

*—G. V. Westbrooke, Apiary Instructor, Auckland.*

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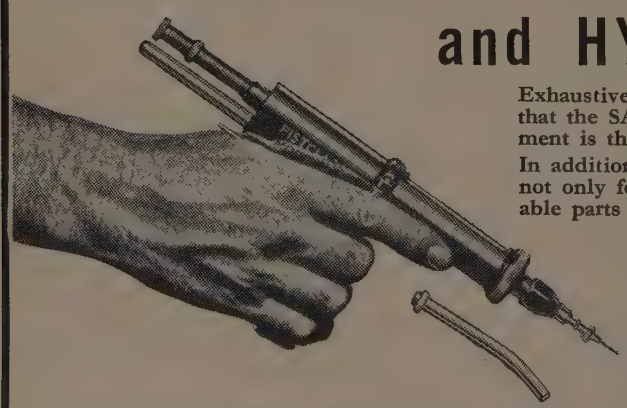

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# Poultry-keeping Section.

## Preparing for the Hatching Season.

A NEW hatching and rearing season is at hand, and poultry-keepers are about to enter upon the most important season of the year. So much depends upon the successful rearing of sufficient good pullets to renew the flock that no poultry-keeper can afford to leave anything to chance.

Every care should be taken to ensure that the plant and equipment are in good working-order before the busy season starts. If this is done before chickens start to arrive there will be more chance of giving attention to the all-important work of hatching and rearing. That little extra attention very often means more and better pullets. Only poultry-keepers who have been through a very busy rearing season know what a strain it is, and for that reason everything which will lighten the strain should be attended to. All repairs to fences, gates, nests, food-troughs, incubators, and brooders should be attended to at once, if they have not already been done.

### Feeding-space Important.

It is sound economy to have an extra food-trough on the plant. Many poultry-keepers fail to realize the great importance of allowing plenty of trough or feeding space for both young and old stock.

At times many different sizes are observed among young stock of the same age, and this is often due to the fact that some of the birds do not get sufficient good food. Stock should never be forced to crowd at feeding-time, especially chickens and young growing birds.

If insufficient feeding-room is provided it often happens that the strongest—and those with plenty of confidence—get plenty of the best food, while the more-or-less shy birds do not get enough to enable them to make the necessary development. An extra food-trough will help matters considerably where this defect has been noticed.

Drinking-fountains should be examined and extra ones provided if necessary. It is well to remember that a leaky water-fountain will cause dampness in the brooder-house or laying-shed, and dampness is often the cause of spreading that dreaded trouble coccidiosis.

### Attention to Incubators.

Incubators should be thoroughly cleaned and disinfected, and this should be repeated after every hatch. The doors should be examined to see that they fit correctly, for very often a loose-fitting door is the cause of indifferent hatches.

At times incubator-doors have a habit of sticking, especially if they are kept in a damp place. It may be found that after the machine has been heated up for a day or two the doors will shrink a little and open without trouble. However, if they still remain tight a little vaseline on the tight edges is often all that is required.

### Testing Thermometers.

All incubator thermometers should be tested each season before the machines are set to ensure that they are registering correctly. This is done with accurate clinical thermometers and a basin of warm water (about 100° F.). Take the two thermometers in one hand with the bulbs together and place them in the basin of warm water, which should be kept stirred.

If no clinical thermometer is at hand, no doubt your local chemist will test a thermometer for you, but it is important that all thermometers be tested before the start of each season, as a degree or so makes a big difference in the size and strength of the hatch. It is a good policy to have a spare thermometer on hand in case one should get broken during the season.

### Check on the Connecting-rod.

At times a fluctuating temperature is caused by the rod connecting the thermostat and the arm carrying the disk over the lamp becoming bent. This rod should be carefully examined, for if there is any kink in it the pull will not be direct and the disk will not rise and fall in harmony with the thermostat.

### The Lamps.

All lamps and burners should be boiled in water containing a little baking-soda. Fresh wicks should be provided, and a fresh piece of mica might be required for the lamps. Care should be taken to see that all machines are set perfectly level.

If trouble has been experienced in the past and the cause is not known it is advisable to get into touch with the manufacturer of the machine if possible, for he is the most likely person to be in a position to advise you correctly.

### Brooder and Brooder-houses.

Brooders and brooder-houses should be thoroughly cleaned and disinfected, and if it is intended to rear extra pullets care should be taken to see that ample brooder accommodation is provided. Several cases have come under notice where heavy losses have been experienced because of inexperienced poultry-keepers trying to rear more birds than they have brooder accommodation for.

It is well to remember that chickens require to be kept under the brooder for at least six weeks, especially during the early part of the season, and if they are overcrowded or are removed from the heat too soon there is grave danger of their receiving a setback, from which they may never recover. It is much wiser to rear 300 pullets well than 500 indifferently.

### Mating-time.

Experiments have shown that it is possible for some eggs to be fertile twenty-four hours after stock have been mated, but, generally speaking, it is advisable to allow at least from five to seven days after stock have been mated before saving eggs for incubation; in fact, most commercial men like to mate their birds a few weeks before eggs are required in order to give the stock time to settle down.

August and September are looked upon as the two best months of the year in which to hatch chickens—August for the heavy breeds, and September for the light breeds. It should be the endeavour of

every poultry-keeper to hatch all he requires or has accommodation for during August and September, for late-hatched stock seldom do well or turn out satisfactorily.

If more stock have to be reared than can be hatched during these months it is advisable to start a little earlier, for, while naturally-hatched October chickens reared on fresh ground may do quite well, it is very rarely that artificially-reared October-hatched chickens do as well.

### Number of Hens to a Male.

The number of hens to mate with each male in order to obtain the best results will depend upon the breed, age, and vitality of the birds, but as a rule from eight to ten hens of the heavy breeds and from twelve to fourteen hens of the light breeds to each male will give good results.

The most popular practice is to mate hens entering their second season with well-developed cockerels from at least ten to eleven months old. It is always safer to use cockerels during the early part of the season, as cock birds entering their second or third season cannot be depended upon to give good fertility early in the season.

While it is stated that the mating of second-year hens and cockerels is the most popular system it must not be overlooked that older, *proved* hens and cock birds often give the very finest stock, and such birds should be retained as long as they will give good fertility and strong healthy chicks.

### Selecting Breeding Males.

Some poultry-keepers fail to appreciate the great importance of the breeding males. They do not give them nearly the same attention that is given to the growing pullets, and during their developing-stage they are often crowded into small sheds and yards where they cannot make that desired growth or build up that great vigour and constitution which are so necessary in a good-breeding male.

It is advisable to remember that if a male is mated with fourteen hens he will have an influence on every chicken hatched and is really fourteen times more important than each of the hens. This does not mean to infer that every care should not be taken in the selection of hens, but it is desired to impress the great importance of a good-breeding male.

### Desirable Points.

The first requirement of a good-breeding male is purity of blood, for experience has shown that cross-bred males are not satisfactory. Secondly, and it may be said of equal importance, are vigour and constitution. These points can best be picked out in the yard or in the paddock by the proud, active, keen, and, as it were, commanding disposition.

They should have a good-sized, strong, well-balanced body, prominent breast, good width across the back, beak strong, and nicely curved, large, bright, keen eyes, strong, clean face, and neck strong and nicely arched. The legs should be strong and set wide apart. The comb should be of medium size, evenly serrated, set well on the head, and straight. The face, comb, and wattles should be bright red in colour.

Strong, active, commanding masculine characteristics should be the points looked for in the good-breeding male, and the more one knows in regard to the pedigree of the birds the better.

### Precocious Cockerels.

There is a tendency with some poultry-keepers to favour too much the precocious, early-maturing cockerels—that is, those that crow first and show big combs, and are often boss of the flock when quite young—but care should be taken not to select too much on early maturity, as very often such cockerels are rather too fine in bone and are inclined to be small in body, and frequently their offspring will be small, will mature too early, and will produce small eggs.

### Replacing Cockerels.

Poultry-keepers who adopt the flock mating system of breeding—*i.e.*, where more than one male is mated to a number of hens—often experience trouble with the males fighting, and at times some good birds may be so knocked about that they have to be replaced. It is really not safe to place good, fresh cockerels in a breeding-pen with strange birds.

If it is found necessary to add more cockerels to a breeding-pen it is a good idea to take all the cockerels from the pen and place them in a dark room or shed with the fresh birds to be introduced. If they are left together in a dark room for forty-eight hours it will often save a great deal of fighting and will prevent valuable birds being knocked about.

### Chick-sexing Examination.

The Department of Agriculture is prepared to undertake a practical examination of students at Auckland, Wallaceville, and Christchurch during August. There must be at least four candidates offering at each centre before examinations at the respective places will be held. A fee of 10s. 6d. will be charged each candidate, payable on application to enter for the examination.

The chickens are to be supplied by the candidates at their own cost under arrangement with the Department. The Department will arrange for the chicks to be hatched under controlled conditions —*i.e.*, the incubator to be locked or sealed (or both) just prior to the chicks hatching out.

Those wishing to present themselves for examination should notify the Director of the Live-stock Division, Department of Agriculture, Private Bag, Wellington, C. 1, not later than the 1st July, when any further particulars required will be supplied.

*—C. J. C. Cussen, Chief Poultry Instructor, Wellington.*

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# N.Z. Federation of Young Farmers' Clubs.

Edited by S. Freeman, Dominion Organizing Secretary.

## Visit of United Kingdom Young Farmers.

AS mentioned in these pages last month, the four United Kingdom Y.F.C. members who joined the New Zealand touring team at Adelaide and travelled with them throughout South Australia and New South Wales accompanied the team on their return to New Zealand and arrived in Wellington by the "Awatea" from Sydney on 19th April. Their visit was of particular interest, as it is the first visit of an official party of Y.F.C. members from overseas.

The visitors remained in the Dominion for nearly three weeks as guests of the New Zealand Federation of Young Farmers' Clubs. They came from different parts of the United Kingdom—E. Christopher coming from England, I. Gilmour from Scotland, E. Williams from Wales, and R. Gamble from Northern Ireland.

The visitors were met at Wellington by the Dominion Organizing Secretary, Mr. S. Freeman, who showed them round Wellington during the day and accompanied them that night on the steamer to the South Island.

**United Kingdom Young Farmers at Christchurch.—Photo taken in the Botanical Gardens. Seated (left to right): R. Gamble (Northern Ireland), I. Gilmour (Scotland), E. Williams (Wales), E. Christopher (England); at back: S. Freeman (N.Z. Organizing Secretary) and L. W. Blackmore (Christchurch District Secretary).**

### Arrival at Christchurch.

At Christchurch they were met by Mr. L. W. Blackmore, District Secretary, and were taken by car over the Port Hills, where they were given a comprehensive view of the Canterbury District. In the afternoon they attended a stock-sale at Addington, and later were motored to Motukarara, where they were the guests of Messrs. H. A. Nutt and F. Coop.

The following day they visited Lincoln College, and after inspecting the pastures, crops, and stock were entertained there to lunch. In the afternoon they travelled by service-car to Timaru, and from there three of them were conveyed to Southburn, where they were entertained by Messrs. I. Caird, A. Bishop, and M. Toohey, the fourth member of the party, I. Gilmour, going to Pleasant Point as the guest of Mr. A. Talbot.

The following day Mr. J. A. S. Miller, Department of Agriculture, took I. Gilmour to Fairlie, where he visited Mr. Andrew Grant's Clydesdale stud, returning via Cave, Cannington, and the Pareora Gorge to Mr. Caird's home. The remainder of the party were taken over the various farms were they were staying and shown the pastures, cropping methods, &c. Two of the members visited Mr. Johnstone's property at St. Andrews, and inspected his stud sheep and Clydesdale horses.

In the afternoon Mr. C. C. Leitch, District Secretary, motored all four to Waimate, where they were met by Mr. Alan Grant and some members of the Waihaorunga Club. At Waimate they were the guests of Messrs. H. M. Whatman, J. C. Hurst, A. Young, and J. Barclay. They were taken on a wallaby hunt on the Saturday, and entertained at a social that evening.

### Shown over Power-house.

On Sunday they were taken to Kurow and shown over the hydro-electric works. On Monday they were brought back to Waimate and taken by Mr. Alan Grant to Oamaru, and then on to Palmerston South, where they went to Bushey Park to see some of New Zealand's best Corriedales.

That evening they were the guests of Mr. Alan Grant and Mr. Sinclair. On Tuesday morning Mr. Grant showed them round the Willowbridge and Morven districts, taking them to various farms, and in the afternoon Mr. Leitch brought them back to Timaru, where they caught the train for Christchurch, embarking on the ferry for Wellington that night.

On Wednesday morning, 27th April, they were met at Wellington by Mr. Freeman, who motored them to Masterton,

arriving at Solway in time for them to take part in the Wairarapa district annual Stock-judging Competitions, where they acquitted themselves very well. The four winners of the Y.F.C. Stock-judging Competitions at the Royal Show, Palmerston North, who toured Australia with the British lads, were present, and a special contest was arranged between the United Kingdom team, the New Zealand team, and a selected Wairarapa team.

The United Kingdom team were the winners, the scores being as follow: United Kingdom, 187 points; Wairarapa, 166 points; New Zealand, 147 points. One of the visitors, Robert Gamble, also won the open Ayrshire class. In the evening the visitors were entertained by the Masterton Club at a dance arranged in their honour.

### Inspection of Stud.

The following morning an inspection was made of Mr. J. Donald's Ayrshire stud. This was an extremely interesting visit for Ian Gilmour in particular, who, coming from Ayrshire, was familiar with the strains imported by Mr. Donald. In the afternoon a visit was made to Mr. J. M. James's property, and his Hereford stud inspected.

The next morning was spent in looking over Sir William Perry's Penrose property, where the visitors had an opportunity of seeing Wairarapa sheep and farming methods at their best. The party spent the afternoon rabbit-shooting.

During their stay at Masterton the visitors were billeted by members of the local clubs—namely, D. McGregor, W. Perry, C. McKay, and A. Fisher, the last named and H. McKenzie, of Carterton, having been their fellow-tourists in Australia.

On Saturday morning, 30th April, Mr. W. F. McLaren, Dominion President, motored the visitors to Palmerston North, where they were met by members of the Manawatu clubs and were later conveyed to Apiti by Alan Viles, a member of the New Zealand touring team. At Apiti the visitors were the guests of Mesdames Viles, Cowan, and Spence. The Sunday was spent in sightseeing round the Apiti and Kimbolton districts, and on Monday the visitors returned to Palmerston North with Alan Viles.

During the morning a visit was paid to the Plant Research Station, the visitors being greatly impressed with the trial plots and pedigree-seed-production areas shown them by Mr. E. Bruce Levy. Although Massey College was included in their itinerary, time did not permit their paying a visit. After lunch the tourists were motored to Hawera by Mr. C. J. Hamblyn, Fields Superintendent, Department of Agriculture.

### In Taranaki.

In Taranaki the clubs co-operated in the entertainment of the United Kingdom Young Farmers, and members of the various clubs travelled with them to the various places visited. The visitors arrived at Hawera in time for tea on the Monday.

On Tuesday morning they were given a civic reception by the Mayor of Hawera, Mr. J. E. Campbell, at the Borough Chambers. They were also welcomed by Mr. P. O. Veale on behalf of the South Taranaki clubs, and by Mr. E. K. Cameron on behalf of the South Taranaki Farmers' Union. During the morning they visited Mr. A. J. Corrigan's farm and the Turuturu Mokai Redoubt, where a descriptive talk was given by Mr. J. Houston.

In the afternoon visits were paid to the Joll Co.'s dairy factory at Okaiawa, Mr. E. J. Betts' farm, the Waimate West Demonstration Farm, and Mr. H. E. Lloyd's poultry-farm at Manaia. In the evening the visitors were entertained at Mr. E. K. Cameron's residence, Hawera. During their stay in Hawera they were the guests of Mrs. R. S. Scown.

### Entertained at Stratford.

On Wednesday morning the party left Hawera, visiting T. H. Walker and Sons' bacon-factory and the Federation of Factories' laboratories and rennet-factory at Eltham. Lunch was provided at the Dawson Falls Hostel, and in the afternoon the party inspected Mr. L. Preece's farm, where they were given afternoon-tea.

Proceeding to Stratford, the visitors were entertained by the Toko and Cardiff Young Farmers' Clubs to tea. Among those present were Mr. C. J. Hamblyn, Mr. J. E. Davies (District Secretary, who accompanied the party throughout Taranaki), Mr. A. G. Elliott (Department of Agriculture, New Plymouth), Mr. T. T. Murray, and Mr. A. O'Sullivan, the two last named being Advisory Presidents of the Toko and Cardiff Clubs respectively. The Chairman and Secretaries of both clubs and various other members were also present.

Opportunity was taken before the visitors' train left for Hamilton to exchange views in regard to Young Farmers' Club organizations, both in New Zealand and in Great Britain, and also to discuss with the visitors their impressions of New Zealand farming. The visitors were given a hearty send-off on leaving Stratford.


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### Visit at Hamilton.

On arrival at Hamilton on the morning of Thursday, 5th May, they were met by Mr. T. E. Rodda, Department of Agriculture, and conveyed to Ruakura Experimental Farm, where they were shown the pastures, stock, &c.; and the technique of the various experiments and trials was explained to them. They were motored to Hamilton in time to catch the express for Rotorua, arriving there late in the afternoon. They attended a Maori concert that evening.

On Friday they were taken by Mr. C. S. Dalgleish, Department of Agriculture, to see the thermal sights at Whakarewarewa, and from there to the Horohoro and Ngakura-Guthrie Settlements. In the afternoon they visited Tikitere thermal regions, the Blue and Green Lakes, the buried city at Te Waitoa, and Lake Tarawera. In the evening a visit was paid to the Blue Baths. On Saturday morning the tourists visited Ohinemutu Native Village and Koutu Reserve.

While in Rotorua they were welcomed by the Mayor, Mr. T. Jackson, and Mr. T. E. Johnson, President of the Rotorua A. and P. Association. The Mayor presented them each with a souvenir booklet of Rotorua. The visitors were the guests during their stay in Rotorua of Miss D. Jansen and Mrs. C. S. Dalgleish.

### Visitors' Thanks.

While in Rotorua the party was met by Mr. C. M. Whatman, who, as leader of the New Zealand touring team, travelled with the United Kingdom team throughout Australia. Mr. Whatman motored the visitors to Auckland, leaving Rotorua about 11 a.m. and taking them to the Fairy Springs *en route*. Mr. W. Alexander kindly made arrangements for hotel accommodation in Auckland for the party over the week-end. He showed the visitors round Auckland on Sunday, and on Monday took them over Messrs. Kempthorne, Prosser, and Co.'s fertilizer-works. Mr. Alexander, who is a member of the Y.F.C. North Island Council, also represented the New Zealand Federation by bidding the visitors farewell when they left for Sydney on the "Awatea" at 5 p.m. that afternoon. The Organizing Secretary was unable to be in Auckland to see them off, but sent them a telegram. He received from them a letter signed by all four members of the party expressing their thanks to all who had made their stay in New Zealand so pleasurable. They also enclosed their impressions of New Zealand, and it is hoped to publish these in this section at a later date.

# Tour of New South Wales.

H. McKENZIE, Carterton Club.

THE New Zealand Young Farmers' Club touring team left Adelaide on the "Strathmore" in company with the four United Kingdom Young Farmers—E. Christopher (England), I. Gilmour (Scotland), E. Williams (Wales), and R. Gamble (Northern Ireland). On our way to Sydney we called in at Melbourne, where we visited the Museum and Botanical Gardens, and were also shown over the printing-plants of two newspapers.

On arriving in Sydney the party divided, two United Kingdom members (E. Williams and R. Gamble) and two New-Zealanders (C. M. Whatman and Alan Viles) going south, and the rest of the party the other two United Kingdom members (E. Christopher and I. Gilmour), A. Cowan, A. Fisher, and myself, going north.

We travelled as far as Tenterfield in the Central Tablelands district, where we had the opportunity of inspecting a very good-quality stud Jersey herd. We were also shown over a farm on which maize is grown extensively for commercial purposes, and visited Colonel Brunner's station of 11,000 acres, with a carrying-capacity of 1½ sheep per acre besides cattle. There were a large number of wild kangaroos on this property.

**Fig. 1.—A subterranean clover brush which is used for harvesting seed.**

### Latest Butter-packing Methods.

Four days were spent in and around Glen Innes. We paid a visit to Inverell and inspected a butter and bacon factory. Butter is made every other day, and we were very interested in the latest packing-methods which were in use. We also saw a wheat silo with a capacity of 168,000 bushels, and were shown over a flour-mill. We visited Inverell Station and inspected Merino and Hereford studs. Maize was being cut for silage with a special maize-binder.

We also visited the Government Experimental Farm, and of particular interest was the Plant Breeding Section, which included wheat and tobacco. We inspected pastures and manurial trials, and were struck with the excellent growth of cow-grass, rye-grass, and Phalaris. The fertilizers experimented with were super, potash, and sodium nitrate. Extensive trials were being conducted with soya beans, and also with maize, some of the latter crops yielding 45 bushels per acre.

We paid a visit to Red Range and inspected good maize and potato growing

areas, and also had the opportunity of visiting the dairy and wheatgrowing farms throughout the district. We also visited a large Corriedale stud, one of the best known in New South Wales, the property of 3,000 acres carrying 5,000 sheep and 600 head of cattle. There were extensive areas of subterranean clover on this property. The elevation at Glen Innes is 3,518 ft., with a rainfall of 31 in.

### Gold-mines Visited.

Five days were then spent at Armidale, the elevation there being 3,333 ft. with a rainfall of 31 in. We visited Hill Grove goldfield, where both mining and cyaniding are carried out. Gold here, incidentally, is worth £8 per ounce. The mine is 3,000 ft. to the bottom of the gorge; 2,000 ft. of the shaft is now closed. Visits were made to several large stations where improved pasture methods are being carried out. The swards are mainly clovers and Phalaris.

The sheep on these stations are Merinos and Corriedales, and the cattle Devon, Aberdeen Angus, and Hereford, and also a cross of the last two mentioned. Crutching was in progress at the time, which naturally interested us. A particularly good strike of turnips had just broken into main leaf. The ground had been worked twice with a tractor and rotary hoe, and turnip-seed at the rate of 1½ lb. per acre had been broadcast.

Following this we spent five days at Tamworth, which has an elevation of 1,279 ft. and a rainfall of 26 in. We visited various farms in the surrounding districts, and saw irrigation work being carried out. Lucerne is grown extensively, and in some parts as many as eight cuts are taken off per annum. Lucerne is also sown in the pasture. We were able to see hay-pressing in operation. The hay-press was worked by a horse, and 80 bales was considered a good day's work. The bales go twelve or fourteen to the ton. Three battens are placed on either side, and the bale is banded with three wires. We were also able to see some of the Junior Farmers' Club project work, such as poultry-rearing, and lucerne and wheat growing.

### Annual Shows Attended.

In each of the above-mentioned districts we attended the annual shows, which last for three days. We saw there some very good-quality horses, beef cattle, and Merino sheep; very few other sheep were represented. As none of the districts are very suitable for dairying, the dairy-cow classes were, on the whole, poor. There were, however, some very fine district exhibits in the produce halls.

We also visited the Manilla Show, which is a two-day show. The entries there were on a par generally with the other shows, the Merino classes being decidedly better. There were also some very good entries of Southdown and Corriedale sheep. An interesting visit was also paid to the Manilla Rural School.

Two days were then spent at Newcastle, which has a rainfall of 45 in., where the following visits were made: Broken Hill Proprietary, Ltd., steelworks (these works cover 486 acres and employ 7,000 men, with 85 miles of lines on which twenty-eight trains are running); Rylands Bros., wire and nail works; Stuart and Lloyds, pipeworks, galvanized steel, and steam-pipes; the Electric Lamp Manufacturing Co. (Australia), Ltd.; and the abattoirs and saleyards.

During the whole of the itinerary we were exceptionally well looked after, and the social side was well catered for. Civic receptions were tendered us by day, and we were entertained at pictures and dances in the evenings. At the end of this instructive and enjoyable tour we returned to Sydney for the Royal Show.

**Fig. 2.—Soya beans at the Government Experimental Farm, Glen Innes, N.S.W.**

# Progress of Clubs in Marlborough.

D. R. WILKIE, District Secretary, Blenheim.

ALTHOUGH the number of clubs in the Marlborough district is small as yet, the interest and enthusiasm of members is well displayed by the variety of their activity and the scope of their work. The movement has grown considerably since its formation in Marlborough a little over two years ago, and there is every indication of further increases in the near future.

At Blenheim the "parent club" has done excellent work and has helped to spread the movement through other districts. There are new clubs at Seddon and Ward, while a further club is in the process of formation at Rai Valley. All clubs are strong in numbers, and meetings are held fortnightly.

During the past year two very successful field-days were held—one at Blenheim and the other in the Seddon district. Both fixtures were well attended, there being seventy to eighty members and older farmers present on each occasion. Farmers to whom the clubs have already expressed their appreciation have been only too willing to help on these occasions, and have arranged demonstrations on various classes of stock, including Merino, Southdown, Romney, and Suffolk sheep, pedigree Canadian Berkshire pigs, and Jersey cattle. The Department of Agriculture also assisted with pasture inspections, visits to experiments, linen-flax growing, and apple growing and grading.

The interest taken in these field-days was gratifying, and it is intended to hold a greater number in the future. Lectures and inter-club debates have

been a feature of the Y.F.C. activities, and impromptu speech evenings have brought out much latent talent. Last season members attended an Educational Week held in Nelson, and as this was very successful it is hoped to arrange for a similar week this season.

The clubs sent five delegates to the Royal Show at Palmerston North to take part in the stock-judging competitions, and although none of the entrants appeared in the final team much valuable experience was gained. It is hoped to conduct a similar stock-judging competition for young farmers at the Blenheim Show next October.

The social side of the club's activities has not been overlooked, two very successful dances having been held. The support accorded these fixtures was most gratifying and placed the clubs in a sound financial position.

**Seddon (Marlborough) Club's field-day—morning tea at Richmond Brook.**

The movement in Marlborough has the support of the farming community, and by reason of this support and the energy and enthusiasm of the members themselves the future growth and well-being of the movement in this district seems to be definitely assured.

# Profitable Shelter on the Farm.

A. E. WEBB, Mangatawhiri Club.

PLANTATIONS on the farm was a question very thoroughly discussed by many members when the Mangatawhiri Club held a field-day at Wesley College Farm, Paerata, recently. The subject of farm-shelter is, to my mind, so interesting that I would like to put forward my ideas on the topic for the discussion and criticism of other members.

To begin with, there is the possibility of using those odd, steep, and often dirty gullies and corners for the growing of valuable timber. So many of our farms have these useless (from a pasture point of view) pieces. Running through Wesley College Farm is a deep gully which, we were told, was once very dirty with blackberries, &c. This has been planted with blue-gums and macrocarpas and is now, besides being very attractive, not only clean, but also a big potential source of fencing timber.

This plantation was the subject of a discussion I had the following day, and I realize that opinions would vary considerably over the type of tree planted and the using of a gully for plantation purposes, but for the moment I must leave my own opinions until a little later. I know, also, of another and quite distant farm of a small area (about three acres) that is planted with *Pinus insignis* spaced according to Forestry Department ideas. These trees are fine, straight timber and add considerably to the value of the farm. The possibility of growing valuable timber on waste portions is well worth considering.

**Fig. 1.—Mangatawhiri Club's field-day at Wesley College, Paerata: Demonstration on a station by Mr. Barber, farm-manager.**

### Effect on Health of Stock.

Then, of course, there is the value of shelter-belts where the health of the stock is concerned. This has been stressed so much and is so apparent that it is hardly necessary for me to touch on it here, but I have heard it said that plantations are draughty and for that reason dangerous to the health of stock. I cannot agree with this, although I realize that some plantations are indeed draughty. In my opinion this is a matter for planning.

For instance, the trees in a single row of *Pinus insignis* (untopped) soon outgrow their usefulness, but a double row of *Pinus insignis* (topped suitably) or a treble row of gums flanked on both sides by either Lawsonianas or Macrocarpa make a plantation which will cause very little draught. Such a plantation, at all events, should be treated and planned as a breakwind and for "distant" use.

For hedges immediately surrounding paddocks there are several types of tree

that should make an almost windproof shelter. Foremost among these is the Cypress family. For instance, a hedge of Lawsonianas (suitable land which is not too wet is needed) if kept topped becomes after a few years nearly perfect wind shelter. We must not forget, of course, that shelter from the sun in summer is almost, if not quite, as important as winter shelter. This has been brought home to us recently during the outbreak of facial eczema among stock.

On the small farm one cannot afford to use too much land, and an odd corner plantation or two must suffice, but on the bigger farms the type of plantation mentioned previously (preferably planted on the summits or ridges of paddocks) is ideal. I do not feel I can endorse the practice found in many places of planting trees in a gully except under certain conditions. After all, a gully bottom usually is good land and is in itself a sheltered position. In a very steep gully, however, it may be quite an advantage, for such a gully is difficult to cultivate and may gradually "go back" and become weed-infested. In the majority of cases the gully bottoms are better left bare, although it is probably largely a matter of opinion.

**Fig. 2.—Mangatawhiri Club's field-day at Wesley College: A visit to the dairy.**

### Increased Value of Farm.

There is another aspect—the increased value of a farm with good shelter. The cost of fencing and planting is fairly high, and is, no doubt, the reason why shelter-belts are not a great deal more in evidence, but when the increased production and better health of the stock are taken into consideration, *plus* the enhanced value of the farm, then the initial outlay and trouble are really a very good investment.

So far I have allowed only strictly utilitarian ideas to dominate my views, but I would like to enter a plea for the beautifying of the farm. Much could be done in this direction without extra strain on the pocket and without departing too far from practical methods. The best time to start is when planting trees initially—perhaps a few flowering gums or similar trees planted with the others.

This is a matter, of course, that must be left to the individual, but when one considers that one does not live to work but works to live, surely a little thought given to pleasant surroundings is worth while. At all events, even only a few trees planted every year are better than nothing. They mature very rapidly and soon bring their own reward.

# Among the Clubs: Reports on Activities.

## Western Southland.

*Lochiel.*—Lecture on "Grasses," by Mr. A. Stuart, Department of Agriculture. This is a new club, and is already showing great promise.

*Thornbury.*—Mr. J. Fisher, Otautau, gave a very interesting talk on his recent trip overseas.

*Woodlands.*—Discussion on the educational week to take place at Waitaki. Lecture by Mr. A. Stuart, Department of Agriculture, on "Grasses and their Value in Southland."

The Thornbury and Woodlands clubs' members combined in a visit to the Makarewa Freezing-works, the latter club members being the guests of the former. There was an attendance of over forty. After a thorough inspection of the works had been made, Mr. W. Falconer gave a talk and demonstration on the dressing and care of mutton carcasses preparatory to shipping.

## Eastern Southland.

*Crookston.*—Lecture on "The Use of Artificial Fertilizers," by Mr. S. D. Blomfield. Report by delegate to the District Committee meeting held at Gore.

*Moa Flat.*—Discussion on ways and means of increasing interest in the Y.F.C. movement.

*Otama.*—Discussion; club members to support the Waikaka Club in the Dog Trials at a field-day in May. Report by club delegates, J. McMeehan and P. Mackay, on the recent District Committee meeting held at Gore.

## South Otago.

*Clinton.*—Arrangements finalized for a concert and dance. Address by Mr. F. Nicholson, manager, South Otago Farmers' Freezing Co., on his recent tour abroad. Mr. Nicholson's talk was illustrated by films taken on his tour. At the previous meeting there was a debate between the club and the Farmers' Union, the subject being "Pastoral Agriculture." Messrs. J. Murney, E. James, and W. Clarke were the speakers for the Farmers' Union, while K. Whiteside, J. Roy, and J. Mitchell represented the Clinton Y.F.C. The Farmers' Union were adjudged the winners.

*Lawrence.*—Arrangements for annua ball; election of delegates to the District Committee; special committee set up to make arrangements in connection with the visit of the Bay of Plenty touring members.

*Milton.*—Address by Mr. McDonald, M.R.C.V.S., veterinarian, Balclutha.

## Central Otago.

*Alexandra.*—Discussion on entertaining the Bay of Plenty Y.F.C. touring members. This was followed by impromptu speeches.

*Arrowtown.*—Arrangements for dances, &c. Report by club delegates, H. Perriam and R. Scott, on the recent District Committee meeting at Alexandra. Messrs,

Scott, Perriam, and Beaton gave talks on their recent trip to Canterbury. Mr. G. G. Calder spoke on the recent meeting of the Provincial Council at Dunedin.

*Roxburgh.*—Mr. R. Kinnaird gave an interesting talk on his tour of Europe. Arrangements for the visit of the Bay of Plenty Y.F.C. touring party.

*Upper Clutha.*—Meeting at Mr. J. S. Hunt's residence; full meeting, only one member being absent. Mr. Hunt gave a very interesting and instructive lecture on "Paddock Sheep-farming and What I Have Learnt since I Started."

## Dunedin.

*Middlemarch.*—Talk by Mr. J. M. Smith, Fields Superintendent, Department of Agriculture, on "Some Aspects of the Y.F.C. Movement."

*South Taieri.*—Lecture by Mr. H. Doyle, Government Veterinarian, on "Some Ailments of Sheep."

*West Taieri.*—Arrangements for lecturers at future meetings, &c. The members combined with the members of the W.D.F.U. and listened to an interesting lecture by the Rev. Hugh Graham, of Mosgiel, whose subject was "Scottish Literature and Vernacular."

## North Otago.

*Enfield.*—Five members gave papers on "Is Irrigation Feasible in this District?" Following on this, each member present spoke for three minutes on "The Kind of Farm I Would Like."

*Five Forks.*—Talk by Mr. Widowson, of Messrs. Wright, Stephenson, and Co., on his trip to Australia with the returned soldiers.

*Papakaio.*—Interesting and helpful lecture by Mr. Simpson on "Farm Finance."

*Upper Waitaki.*—Talk by Mr. J. Tripp on "Modern Mechanics of Sheep-yards," and "Sheep-yard and Fence Construction."

*Waitaki-Hilderthorpe.*—Lecture by Mr. J. B. Chapman on "Farm Shelter." At the previous meeting the same speaker gave a talk on "Eradication of Couch."

## South Canterbury.

*Arno.*—Talk by Mr. J. McRae, jun., on "Training the Sheep Dog." At the previous meeting the speaker was Mr. A. Larnder, of the Power Board staff, who gave an address on "The Electric Lamp."

*Geraldine.*—Address by Mr. W. H. Staniland on "The Dairying Industry."

*Maungati.*—Impromptu speeches. Each member participating spoke for a set time, drawing his subject from pooled "suggestions" supplied by all. Arrangements were made for a debate with the Southburn-Lyalldale Club.

*Pleasant Point.*—Discussion regarding programme of lectures, &c. Decided to hold two meetings monthly, lectures to be arranged alternately with discussions, debates, &c. Arrangements in connection with entertainment of the visiting Bay of Plenty touring members at a dance. This is a new club with a roll call of thirty-five members to date.

*Southburn-Lyalldale.*—Talks by Messrs. J. Stowell, Esk Valley, and C. Coxhead, Timaru, on "The Wheat-growing Industry" and "Mercantile and Trade Terms of Produce" respectively. Club members A. Bishop and R. Gray were appointed to represent the club at a meeting of interested bodies to discuss the continuance of the St. Andrews district bay at the Winter Show. At the previous meeting short speeches on various subjects were given by the following club members: A. Bishop, K. Caird, D. Gray, M. Tookey, and Robt. Gray.

*Waihaorunga.*—Election of concert committee; arrangements for club debates, &c. Lecture by Mr. Millar, Department of Agriculture, on "Grubs, Insects, Parasites." Short account of the routine at Lincoln College by Mr. I. G. Hurst, a Y.F.C. scholarship holder. At the previous meeting a lecture was given by Mr. G. M. Collins, U.F.S. Dispensary, on "The Ailments of the Horse."

## Christchurch.

*Darfield.*—Discussion on proposed North Island tour. Arrangements *re* finance for wool-classing. Discussion on entertainment of visiting Bay of Plenty Y.F.C. touring members; broadcasts from 3YA; debates.

*Dunsandel.*—Discussion on proposed North Island tour. Arrangements for broadcast talk from 3YA. Dance arrangements finalized.

*Ellesmere.*—Address by Mr. G. W. R. Osborne, club advisory president, on "The Do's and Dont's in Farming."

*Little River.*—Lecture by Mr. Siddall on "Different Illnesses of Sheep, Cattle, and Horses."

*Springston.*—Talk on "Farm Accounting," by Dr. G. W. Weston, Lincoln College.

## North Canterbury.

*Amberley.*—Discussion *re* club tour. Lecture by Mr. A. Flay, Lincoln College, on "Feed Control in Relation to Farm Management."

*Cust.*—Lecture by Mr. A. S. Nash, Department of Agriculture, on "Linseed as a Payable Crop." The lecture dealt with linseed both as a seed crop and as a fibre crop.

*Hawarden.*—Lecture by Mr. G. K. L. Knott, M.R.C.V.S., on "The Blow-fly Pest," and "Winter Feeding of Sheep."

## Marlborough.

*Seddon.*—Impromptu speeches; subjects selected by Mr. D. R. Wilkie, District Y.F.C. Secretary, Mr. Lockhart acting as judge. All members present took part, and the competition was won by J. Langridge. At the previous meeting a film was exhibited showing caterpillar tractors working under all conditions.

*Ward.*—Address by Mr. J. E. Irving on "The Conduct of a Meeting." This is a new club with a membership of twenty.

## Nelson.

*Dovedale.*—Talk by Mr. J. Fowler on his recent visit to Australia, dealing particularly with the Sydney Royal Show.

*Moutere.*—Discussion on educational weeks. Programme of lectures arranged.

*Motupiko.*—Demonstration on rope-splicing by Mr. Scalfe. Talk on "The Working of Petrol Engines," by Mr. M. G. C. Newport.

## Manawatu.

*Apiti.*—Talks by A. Cowan and A. Viles (members of the New Zealand Y.F.C. touring team) on their recent tour of parts of Australia.

*Bunnythorpe.*—Lecture by Mr. H. R. Denize, Department of Agriculture, on "Animal Husbandry." This is a new club with a membership of nineteen.

*Colyton.*—Lecture by Mr. Gorman, Plant Research Bureau, on "Grasses and Pastures." This club has been recently formed and already has a membership of twenty-six.

*Halcombe.*—Lecture by Mr. P. G. Stevens on "Animal Genetics." At the previous meeting a lecture was given by Mr. G. Buchanan on "Grasses and Clovers."

*Johnsonville.*—Arrangements for seven-a-side football tournament, and also for a dance.

*Linton.*—Arrangements for dance and seven-a-side football. Address by Mr. G. S. Robinson, Department of Agriculture, concerning the projected Y.F.C. activities at the forthcoming National Dairy Show, Palmerston North. A debate was conducted at the previous meeting.

*Otaki - Te Horo.*—Lecture by Mr. A. J. Galpin, Department of Agriculture, on "Draining."

*Pohangina Valley.*—Address by Mr. G. Crossley on "Public Speaking and Debating."

*Rangiwahia.*—Talks by A. Cowan and A. Viles (members of the New Zealand touring team) on their recent Australian tour. Both are members of the Apiti Club, and are visiting other clubs in order to give their experiences.

*Rongotea.* — Addresses by Messrs. Gorman and Hart, of the Plant Research Bureau, on "The Strains and Breeding of Grasses."

*Woodville.*—Debate, "Super *v.* Slag"; speakers, K. Strand and S. Worboys (for slag), K. Mitchell and A. Compton (for super). The "slag" supporters won by 37 points to 34½. Mr. Lyons acted as judge, and outlined the correct procedure in debate.

### Wairarapa.

*Carterton.*—A. Fisher and H. McKenzie (members of the N.Z. touring team) outlined their Australian tour.

*Greytown.*—Inter-club debate with Carterton Y.F.C.; subject, "That the Young Farmer of To-day has Equal or Greater Opportunities than his Grandfather." The visitors (Carterton) won by 257 points to 224.

*Mangatainoka.*—Arrangements for ensilage competition. Debate held, the subject being "That Spring Sowing of Pastures in this District is Better than Autumn Sowing." Speakers were I. Algie, H. Bairstowe, and R. Bridge (spring sowing), and K. Pryde, G. Cotter, and S. Hughes (autumn sowing). The supporters of autumn sowing were the winners.

*Martinborough.*—Lantern lecture by I. McLaren, a club member, on "A Trip to Europe."

*Masterton.* — Inter-club debate with Tinui Y.F.C.; subject, "That Heredity is a Greater Influence than Environment." The visitors (Tinui) won by five points.

*Pongaroa.*—Joined with the Farmers' Union to listen to an address by Mr. Neiderer, Farmers' Union Organizer. At the previous club meeting a general discussion was held on various topics of farming interest.

### South Taranaki.

*Kaponga.*—Talks by members on the recent South Island tour, as follows: J. Brassell, K. Rowe, M. Kissick, R. Edgecombe, G. Gordge, and L. Chamberlain. Report on dance, which was a great success.

*Waverley.*—Debate, "Horse *v.* Tractor." Eight members took part, four on each side. Mr. Boyer acted as judge, awarding the prize for the best speaker to W. Matthews.

### North Taranaki.

*Cardiff.*—Talks by Messrs. Mills and Smith on the recent Y.F.C. tour of the South Island. Mr. C. W. Whatman, member of the N.Z. touring team, gave a talk on the Australian tour. Arrangements were finalized for a field-day. At the previous meeting an address was given by Mr. Davies, of New Plymouth, on "Trees."

*Toko.*—Talk by Mr. L. Morfell, of Huinga, on "Sheep." The speaker dealt with the purchase of ewes, mating, cull lambs, and general.

### Wanganui.

*Marton.*—A club has recently been formed in this district, and shows promise of becoming very progressive.

*Taihape.*—Field-day on Mr. J. F. Studholme's estate, "Te Hora." The demonstrations included draught horses (Mr. A. E. Samways) and hacks (Mr. F. R. Cotterill). There was an attendance of thirty.

### Southern Hawke's Bay.

*Norsewood.*—General discussion, led by Mr. R. Robinson, on "Management of Pigs." Arrangements for a social evening (table tennis and cards).

*Onga Onga.*—Address by Mr. J. W. Palmer, District Secretary, on club affairs.

### Northern Hawke's Bay.

*Meeanee.*—Interesting discussion evening, based on talks by club members. J. Guthrie described a proven method of killing blackberry; this was freely discussed by members. L. L. Griffiths, speaking of ragwort, advocated its immediate control in the district before it gained a hold. E. Fairey, whose property during the 1931 floods was totally covered with silt to a depth of 4 ft., gave his experiences in sowing grass-seed on the silt. He considered it to be a waste of good seed and money. Considerable discussion ensued, many other members agreeing with his views. S. Parsons reported on post-mortems held by Mr. A. D. Laing, Government veterinarian, on lambs troubled with internal parasites. He described the symptoms, cure, and prevention of the trouble. There were twenty-two members present at the meeting.

### Poverty Bay.

*Te Karaka.*—Paper read by S. Linton, a club member, on "Hogget Mortality and its Prevention."

### Bay of Plenty.

*Katikati.*—Discussion on proposed tour of South Island. Impromptu speeches; competition won by M. Wilson.

*Omokoroa.*—General discussion. Arrangements for field-day.

*Opotiki.*—Arrangements *re* dance, and entertainment of Manawatu Y.F.C. touring party. Football match with Taneatua Y.F.C.

*Paengaroa.* — General business. Decided to extend a welcome to and provide afternoon tea for the Manawatu touring party in the Paengaroa Hall. Discussion on projected South Island tour.

*Te Puke.*—Lantern lecture by Mr. C. Walker, Department of Agriculture, on "Pumice Land Development in the Rotorua District." Social committee to be formed at next meeting.

*Waihi.*—Lantern lecture by Mr. C. Walker on "Pumice Land Development." Arrangements made for a debate.

*Waimana.*—Address by Mr. Beattie on the forming of pig clubs.

### Te Kuiti.

*Aria.*—Field-day on Mr. Purdie's property, Mahoenui. Demonstrations included Polled Angus cattle (Mr. Tipping), and breeding and management (Mr. Purdie). There were twenty club members, eight visiting club members, and six older farmers present, making an attendance of thirty-four. The visiting members were from the Otorohanga Club.

*Otorohanga.*—Arrangements made for club ball. Combined field-day with Aria Club.

### Rotorua.

*Horohoro.*—General business and discussion; arrangements for field-days, &c.

*Ngakuru.*—General business; talks on grass trials in Ngakuru district.

*Putaruru.*—Paper by S. G. Penwarden, club member, on "The Progress of Farms in the District." Talk by Mr. R. Baldwin on the South Island.

### Waikato.

*Matangi.*—Arrangements finalized for dance. Discussion on the formation of a local pig club. Interesting lantern lecture on "Pig Husbandry" by Mr. H. M. Pierson.

*Te Kowhai.*—Address by Mr. Wm. Allen, on "How to Conduct a Meeting."

### Auckland.

*Mangatawhiri.*—Lecture by Mr. Shroff, Department of Agriculture, on "Fertilizers and Their Values."

### North Auckland.

*Broadwood.*—Address by Mr. J. McKenzie, club president, on "Wool-growing in the Broadwood District." At a previous meeting the club was addressed by Mr. W. M. Grounds on "Chairmanship and Business Procedure." Mr. E. Moss, Department of Agriculture, has addressed the club on "Pastures and Pasture Management," and assisted the members in discussions on such subjects as "The Control of Paspalum," &c.

*Marohemo-Maungaturoto.* — Lantern lecture by Mr. E. H. Arnold, Department of Agriculture, on "Cultivation." At the previous meeting Mr. L. W. Gorman, Plant Research Bureau, gave a lecture on "Grass and Clover Strain Investigation at Palmerston North."

*Matarau.*—Lecture by Mr. E. B. Glanville, Department of Agriculture, on "Fertilizers." A local pig club was formed at this meeting.

*Oruru.*—Lecture by Mr. E. Moss, Department of Agriculture, on "Pastures and Pasture Management." At the previous meeting a practical demonstration and address was given by Mr. E. R. Bird on "How to Conduct a Meeting."

# Health Notes for the Farm.

## Contributed by the Department of Health.

## Hygienic Country Homes.

SIR ROBERT STOUT, in his foreword to Mr. Leigh Hunt's booklet on "Town Planning," emphasized the beneficial effect of a suitable environment on the individual as follows :—

"Before the publication of Darwin's epoch-making book, 'The Origin of Species,' there was much discussion among political philosophers as to whether a change of environment was not sufficient to change the habits and nature of humankind. 'Give us,' said one of the reformers, 'the children to train, and let them have beneficent surroundings, and crime and evil of every kind will be abolished from the community.' We have since then learned that the potency of heredity is an important factor in human history. What Oliver Wendell Holmes said was true—that the education of the child, to be efficient, must begin perhaps two hundred years before it is born. No doubt it has also been proved to us that the individual and the species may be modified by environment, and on this basis the hope of progress must be built.

"Given healthy surroundings, with a beautiful outlook and a good social life, and human beings grow physically, morally, and socially strong. It is true, however, that even in bad surroundings there are many who escape maladies and lead a good life. These, however, are the rare and strong individuals that sometimes come among us. We must realize, however, that though heredity plays a most important part in human life yet a good environment is necessary if we want to obtain good citizens. . . . We must have healthy surroundings if we desire to be free from devastating disease."

### Healthy Environment.

New-Zealanders have sprung from sound stock of a good hereditary foundation. How necessary, therefore, is it that such a heritage should be guarded in this land by living in a hygienic home amid healthy environment. Stud stock soon deteriorate with poor pasture and unskilful attention. When all is said, health and body resistance to disease depends upon the hygiene of the home and good housekeeping.

Florence Nightingale, who was the originator of our sick nursing, well understood the importance of sanitation of the home when she wrote of health visitors: "They require an intense and real belief in sanitation and that life or death may be in a grain of dust or a drop of water or other such minutiæ, which are not minute but Goliaths, and the health visitor must be a David to slay them, and have his sweet voice, and must be trained as he was to fight the giants with the simple weapons of every-day use." These simple weapons consist of pure air, wholesome, well-cooked food, pure water, and a clean, well-built, and well-ordered home.

First, with regard to the construction of the home, an hygienic house should be—

(1) Free from serious dampness.
(2) Satisfactorily lighted and ventilated.
(3) Properly drained and provided with adequate sanitary conveniences and with a sink and suitable arrangements for disposing of slop water.
(4) In good general repair.

It should also have—

(5) A satisfactory water supply.
(6) Adequate washing accommodation.
(7) Adequate facilities for preparing and cooking food.
(8) A well-ventilated store for food.

To this should be added means for temporarily storing waste pending its removal, and the house should be free from serious infestation of vermin.

### Site of the Home.

In the country the site of the home should be elevated, sunny, and sheltered from the prevailing wind. Consideration should also be given to the nature of the subsoil, which should be such as will ensure a dry and therefore healthy site. One of the principal influences of the soil upon the general health is through soil moisture. Dampness in or near the surface of the soil may affect the health of those dwelling nearby.

The dwelling should be so constructed as to prevent ground air or moisture from entering the building, and to do this the floor timbers should be clear of the ground and efficient underfloor ventilation provided.

### Lighting and Ventilation.

Lighting and ventilation must also receive every attention, the aim being to get as much sunshine as well as light into the rooms as possible. Windows should be kept very clean and should be open daily. A chimney acts as a valuable extract-ventilator in summer when there is no fire in the grate, for the wind blowing across the top creates an upward current of air. Fireplaces or chimneys should not be obstructed in the summer. Dark rooms favour the spread of disease, and a dingy house makes cleanliness difficult and give comfort to vermin. The house should be planned so that the rooms receive the maximum amount of sunlight,

### Outbuildings.

In the country every consideration should also be given to the position and site of buildings in which the cows, horses, pigs, &c., are housed, thus helping to reduce the labour attending them and simplifying the prevention of undesirable conditions. Manure-bins and stables should not be placed where they are likely to pollute the water-supply, whether from underground tank, well, or creek. It is inviting trouble to allow large heaps of manure to accumulate close to the milking-shed and dairy.

### Water-supply.

In cities there is a water-supply which is carefully guarded against contamination. It is the duty of the local authority to see that there is a sufficient supply of pure water available. In the country care must be taken that the water-supply is pure, wholesome, and plenteous. If the water is procured from the subsoil the well should be sunk in such a position and so constructed and finished on top that there is no danger of contamination.

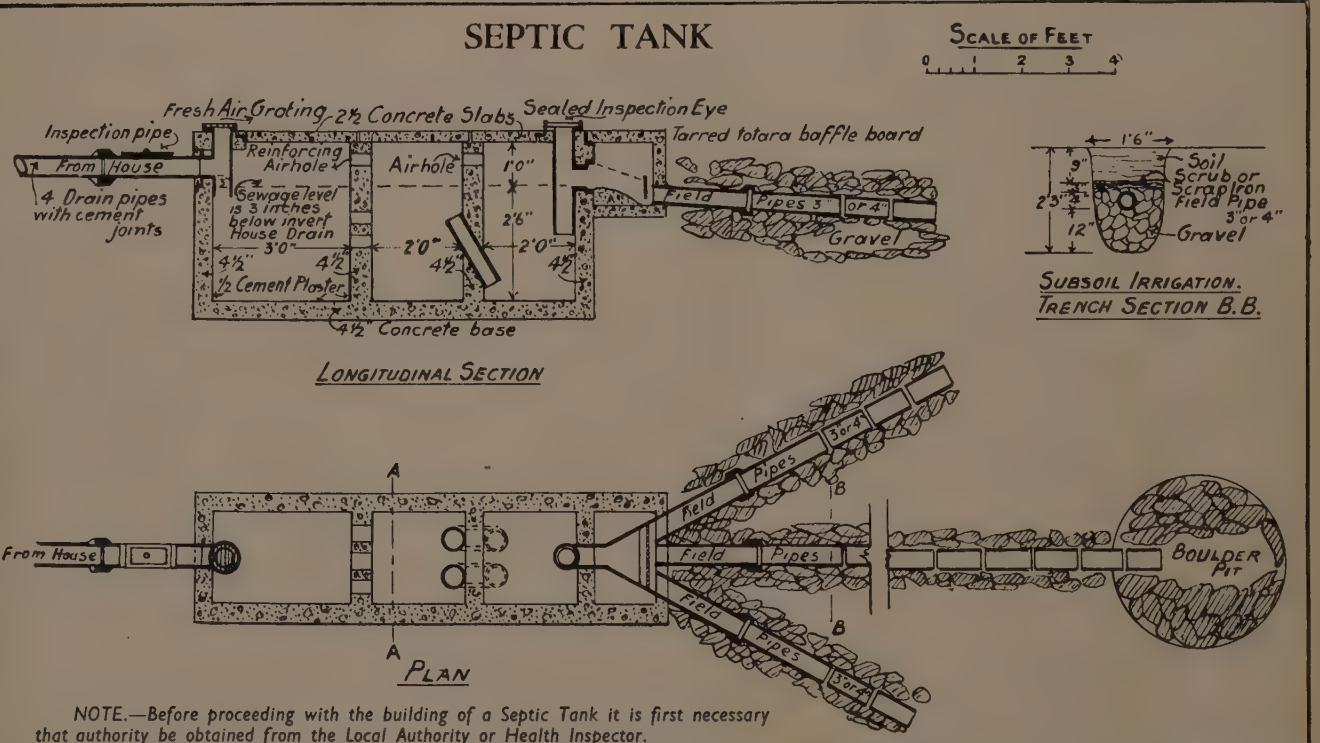
Where storage is necessary, care should be taken that the storage tanks are built of material which will not injuriously affect the water, and they should be so constructed as to be protected from dust and vermin. They should be provided with facilities for periodic cleansing. To avoid a shortage adequate storage facilities should be provided where rain-water is the sole domestic supply.

### Sanitation.

The disposal of household wastes calls for careful consideration. They comprise nightsoil, urine, kitchen refuse, washhouse and bath water, manure, and rubbish generally. The main principle to be observed is to dispose of all these so that no nuisance will be caused, no facilities will be given to flies or other vermin to breed in them, and no pollution of water, either in wells or streams, will result.

Where there is an abundance of water septic tanks may be installed on the lines shown in the illustration. The principal care is for the satisfactory disposal of the effluent. This depends on the type of soil adjacent to the septic tank. If of an open or porous nature the adoption of subsoil drains should be successful. On the other hand, if the soil is close and percolation slow it will be necessary to provide the boulder-pits at the end of the subsoil drains so as to retain the volume of effluent to be disposed of at certain periods of the day. The advice of the Health or Sanitary Inspector should be obtained before the site of the tank is determined.

## SEPTIC TANK




*NOTE.—Before proceeding with the building of a Septic Tank it is first necessary that authority be obtained from the Local Authority or Health Inspector.*

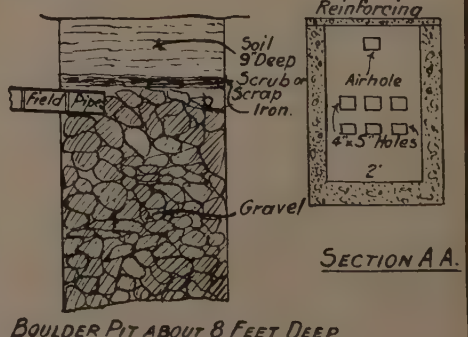
*DRAINAGE and PLUMBING REGULATIONS UNDER THE HEALTH ACT, 1920.*

*CLAUSE 12.—In respect to sewage-tanks the following provisions shall apply :—*

*(a) No sewage-tank shall be constructed within 30 ft. of any dwelling or of any shop, office, factory, or other building in which persons are employed, or of any public building, or in any place where in the opinion of the Engineer it is likely to create a nuisance, or where there is not approved means for the disposal of the effluent from such tank.*

*(b) Every sewage-tank shall be substantially constructed of concrete, brick, or stone, and faced with cement mortar with steel-trowelled surface so as to be watertight, and shall be of approved design with effective means of access to the interior for purposes of cleansing.*

*(c) The effluent fluid shall be conducted from the tank in an approved drain or chamber to an approved outfall in such manner that it shall not be exposed to the open air within 150 ft. of any dwelling or of any shop, office, factory, or other building in which persons are employed, or of any public building or road, unless it has undergone treatment whereby it is rendered inoffensive.*



Considerable success is being attained by the provision of bored-hole latrines in sanitation in Maori districts and other areas where they are suitable, and they have proved satisfactory in several motor camps. Information on their working can be obtained from the District Medical Officer of Health or the Health Inspector.

The pan closet should be well built and kept in good order. The pan contents should be buried in the top soil. If a shallow, narrow trench the depth and width of an ordinary shovel is dug in well-worked loam and the nightsoil placed in it and covered to a depth of 6 in. to 9 in., in three months it will have disappeared, having been absorbed into the soil, which it enriches. In heavy clay soil it will take longer. When buried in deep pits it remains unchanged for months, or even years, a possible nuisance and a source of pollution to wells and ground-water bores.

All drains to carry off water should be taken clear of well or underground tanks so that, should the casing of the latter become cracked, polluted water will not enter. Water from the kitchen sump should be conducted through a grease trap by a separate drain. The object is to pass the greasy water through a small settling-pit which will separate the fat and sludge so that when it reaches the garden the soil will not be choked.

**Disposal of Refuse.**

The proper disposal of dry refuse of a house is of the utmost importance to the health of the inmates. All combustible matter should be burned if possible, and what cannot be burned should be dug into the garden periodically or otherwise satisfactorily disposed of. Neglect and uncleanliness cause houses to become infected with fleas, bugs, and other vermin. It is very difficult to get rid of vermin once a house is infested with them, which emphasizes the importance of keeping the home clean and wholesome.

It is most important to realize the value of health precautions in planning, building, and managing a home in order to ensure healthy living conditions for the family. Serious outbreaks of infectious diseases have originated in homes of those living amid unsanitary surroundings which, with reasonable foresight, could have been avoided. If the fundamental essentials for healthy living are disregarded, the penalty is the same in town or country.

When beauty, comfort, and cleanliness are introduced to the home much is added to life, for character and feeling are things greatly dependent on external influences. "It needs no argument to prove," wrote an essayist sixty years ago, "that if one's abode is subject to the grosser physical disadvantages of smoky chimneys, damp walls, neighbouring bogs, incurable draughts, rattling windows, unfitting doors, and the like, the result upon the temper and the views of the man thus affected will not be a pleasing one. Only very stolid people are not affected by the scenes in which they live."

The countryside, with its open spaces, its isolation from the congested living stream of humanity, its freedom from atmospheric pollution, and its wealth of fresh nutritious products of the soil, should always be the ideal place of habitation, free from any "pestilence that walketh in darkness." So let there be in the country "no place like home" for comfort, attractiveness, and health.

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A farmer in North Canterbury has had good results using linseed as a fattening food for lambs, in conjunction with turnips. He sowed 3 lb. of linseed along with 9 oz. of Bruce turnips in December. Lambs were brought in from the hill country in March and got away fat by end of April. When first turned on to the turnips and linseed the lambs fed on the leaves of the linseed and later they consumed the seed-heads.


# Farmers!

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# The Farm Home and Kitchen.

## Contributed by Department of Home Science, University of Otago.

## Food, Fads, and Fallacies.

IT is truly remarkable how almost every second person one meets nowadays wants to talk about diet. This is, I think, a very good sign. Only a short time ago few people would give serious thought to their diet unless they wanted to reduce. In fact, to most people the word "dieting" meant nothing else but "reducing," and it was not generally realized that all people are dieting all the time.

Dieting merely means following certain principles in selecting what one eats—and, since every one choose what he or she eats, all must be dieting in one way or another. Some, it is true, merely follow the rules of appetite—they eat what they enjoy, and as much as they like. Whether they know it or not, they are dieting, in the sense that they choose to eat in this way.

### Selection of Food.

Others, of course, *select* their food—not only because its flavour appeals to them, but because they know that certain foods in certain quantities are necessary for the well-being of the body. Until recently the latter class appeared to be very much in the minority, and there were many of us who felt that the time was more than ripe for people generally to wake up to the danger of following the eat-what-you-please rule.

It is felt, therefore, that this new interest in food is much to be welcomed, and it is pleasing to observe that many people are giving up their habit of thoughtless eating and are selecting their meals with intelligence and to the best of their knowledge in accordance with their physical needs. One of the most promising signs of this new interest is the way in which people are seeking information about healthful ways of eating.

### Note of Warning.

But this very interest in diet makes it necessary that we should sound a note of warning. Any one with nutritional knowledge who has had an opportunity to study the typical diets used throughout New Zealand in town and country homes knows that there is room for improvement, but there is also the gravest danger that if the community tries to correct dietary defects without basing the improvements on really reliable information a tremendous amount of injury and sickness will result.

When some people become interested in a subject it is, for the time being, almost a religion with them, and they look around for people who will tell them of the miracles which can be achieved through the power of their latest craze. Some such people are now ready to believe that poor diet is responsible for all disease and that correct diets will cure everything, claims which no responsible qualified nutritionist would dream of putting forth. Believing that there is a dietary cure for every ailment, these zealots eagerly accept as true and pass on to others many fads and fallacies about diet.

It is against the blind acceptance and adoption of teachings about diet that I would warn you to-day. When some enthusiast tells you about the miraculous results which she felt after she had tried such and such a diet, do not immediately try it on yourself and your family—the results may be disastrous.

Abnormal diets are for abnormal conditions, and playing about with the diet when no abnormal conditions are present is worse than foolish.

### Changes in Diet.

In almost every talk on nutrition given by this Department during the past eight years we have advised people to see that their diets contain generous amounts of fruit, vegetables, milk, eggs, and whole-grain cereals, and to watch and if necessary reduce the meat and the sweet and the starchy foods made from refined cereals. We do this because we know that a large proportion of New Zealand diets require these changes, and that if they were made there would be a marked improvement in health and mental outlook among the people.

These desirable changes in diet can very easily be made by altering the quantities and proportion of the foods used at ordinary meals. For instance, to serve the extra fruit and vegetables there might be the inclusion of fruit for breakfast, a salad with the lunch, a really good vegetable soup once a day, and so on. To serve more milk there should be more milk soups, milk drinks, and milk puddings, and to use less meat there can be substituted cheese dishes and vegetable dishes. All of these changes can easily be made in any home.

The results of such well-balanced diets are improved health through an increased consumption of protective foods and a small consumption of meat and starchy and sweet foods. All the nutritionists of world standing recommend that diets should be planned on what might be called the mixed-food basis, and it is this type of diet which we recommend. I know that at present there is a great vogue for two or three systems of diet which claim that certain foods should not be mixed, but actually the scientific evidence shows this argument to be a fallacy.

### American Research.

The Year-book of the American Public Health Association in an article "Food Fallacies and Nutritive Quackery" deals with the evidence against this system. The article says :—

"Notwithstanding the large amount of popular scientific knowledge available

in nutrition, the successful preying on the public by faddists and quacks has assumed alarming proportions. Influenced by promises, fanciful appeals to fear, and suggestions, many choose the course offered by the faddists in preference to the advice of reputable authorities.

"Unfortunately, a large proportion of the population is unable to discriminate between the claims of the charlatan or ignorant faddist and those of investigators whose scientific contributions and knowledge have gained for them the position of outstanding authorities. Based on entirely false representation, vicious systems of dieting which do much injury are given in books and pamphlets sold under high-pressure salesmanship.

**Common Fallacy.**

"One of the most common and extensively proclaimed nutritional fallacies is that proteins and starches are incompatible and should be separated into distinct and separate meals. It is maintained that because starches require an alkaline medium for their digestion and proteins an acid medium an antagonistic effect is developed when both are taken together, which seriously interferes with the digestion of each of these classes of foods. One can look in vain through the writings of authorities in text-books and journals for any scientific experimental data in support of this idea.

"Those putting forth the argument ignore the fact that a large proportion of our staple articles of food contain both starch and protein. Adherence to this system would necessarily eliminate from the diet practically all products made from cereals and grains, such as bread, crackers, macaroni, cakes, pastries, &c. It would also exclude potatoes, beans, peas, and many other important foods.

"This absurd system would ban the time-honoured combinations which for generations have been recognized as wholesome and healthful, such as meat and potatoes, bread and milk, bread and cheese.

**No Incompatibility.**

"Investigators and authorities in the field of nutrition are practically unanimous in the opinion that there is no incompatibility between starches and proteins in the diet.

"For example, Dr. McCollum, Professor of Nutrition at Johns Hopkins University, and his co-worker, Becker, write: 'Faddists have hit upon the idea that we should not eat starches and proteins at the same meal because starch digestion is interrupted in the acid stomach, acid being essential to peptic or stomach digestion of proteins. This is a fallacy. There is no significance in this interruption. The cat, the dog, and the cow have no starch-digesting ferment in their saliva, but they thrive on foods rich in starches. All their starch digestion takes place after the food has left the stomach and reaches the small intestines. Nature did not put these animals at a disadvantage in this respect.'

"Fishbein states that: 'Much of what is said by food faddists relative to combinations of protein and carbohydrate is fallacy, without any basis in scientific study.' It has been shown that a mixture of carbohydrate and protein foods is discharged from the stomach in shorter time than protein alone, indicating that, as Cannon says, '. . . . the addition of carbohydrate to the diet accelerates digestion and the discharge of the gastric contents.'

**Studies on Digestion.**

"Studies by Rehfuss, Hawk, and others on human digestion in the stomach involving more than 1,000 studies on 200 normal men, in which a great variety of protein and starch combinations was used, failed to produce any evidence whatever of the incompatibility of these two classes of foods. In order to meet criticisms of the food faddists that different results would have been obtained had the studies been made with chronic invalids instead of normal individuals, Rehfuss has more recently extended the investigations to include a cross-section of medical invalids representing almost every variety of chronic illness encountered in a medical work service.

"Meat was used to represent protein and potatoes to represent starch. The results of these studies, involving hundreds of observations and representing a year's work in medical service, to quote the investigator's own words, again demonstrated 'the absolute inaccuracy of the statement that proteins and carbohydrates are incompatible in the stomach. There is no evidence either in the literature or in my investigation to lead me to believe that proteins and carbohydrates are incompatible in the stomach. The danger of such teaching based on a lack of scientific evidence is manifest, and, while it may be true that many individuals overeat and are presumably better by a reduction of carbohydrates, the unqualified acceptance of such a teaching can lead to the occurrence of serious malnutrition as well as to a lighting—that is to say, a recurrence—of tuberculosis and old infections.'

**Another Fallacy.**

"Another fallacy which finds a prominent place in the doctrines of the nutritional quack is that acid fruits should not be eaten at the same time as carbohydrate foods, including breads and cereal products, potatoes, and sugars of every kind. These foods, we are reminded, require an alkaline medium for their digestion, and it is claimed that without the alkaline reaction of the saliva they would never be digested at all.

"This view ignores the well-known fact that only a part of the carbohydrate digestion occurs in the mouth and stomach as a result of the action of ptyalin in the saliva, and that there are active starch-digesting enzymes in the intestines where carbohydrate digestion proceeds to completion. In fact, starch digestion can proceed favourably in a medium that is practically neutral. The relatively small amounts of the weak organic acids in fruits can have little or no significance in any interruption of starch digestion in the stomach, where the hydrochloric acid of the gastric juice is many times stronger than the fruit acids."

**Reducing Diets.**

This article also refers to reducing diets in the following terms: "Many different systems of dieting and treatment are advocated for weight-reduction, some of which are merely scientifically unsound, while others are positively harmful and dangerous. Many, eager to conform to current prevailing fashions of being slender, through adopting short-cuts to reduction advertised by food promoters and those interested only in their own personal gain, have done themselves harm, bringing on weakness, nervous irritability, and anæmia. Particularly to be deprecated is the use of salts and dangerous drugs.

"In reduction treatment the first consideration is curtailment of caloric intake with the object of accomplishing a gradual loss of weight without sacrificing the amount of protein, vitamins, and minerals salts required for normal body needs, nor even of the calories needed as a source of energy for body temperature and for production of work. Many reducing menus are erroneously based on the elimination from the diet of individual foods, such as potatoes, rice, cereal products, and butter.

"In order to assure an adequate balance of food factors essential for health and normal nutrition it should be remembered that it is not the kind of food that should be restricted, but rather the quantity. As Mendel has aptly stated, 'Sanity in diet calls for moderation in eating rather than exclusion of any wholesome food. Even the slenderest persons need some energy for their daily undertakings.'"

### Principles of Dietetics.

Perhaps I can best end this talk with a quotation from Dr. V. M. Mottram, Professor of Physiology at the University of London. He says: "We poor dietitians are often in a quandary. We hold that one of the greatest needs to-day is the education of the public in the principles of dietetics. Time and time again, if you are interested in medicine and dietetics, you meet people who are playing havoc with their mind and body simply because they worry about what they eat and drink and the various (imaginary) senses of the body they get after eating."

What, then, is the dietarian to say to the layman? He must say something, and yet anything he says may be pounced upon and distorted to the support of some crank by the layman who is too interested in his body to see the truth.

Possibly the best he can say is: "So long as you have protective foods in reasonable amounts in your diet it does not matter what you eat. There are the dairy foods, the market-garden foods, and (fat) fish. But if you suspect that such-and-such a food disagrees with you do not pay too much attention to the suspicion. If you are ill take yourself to the best physician you can afford and let him sift the matter for you. Abide by his orders.

"Above all, do not doctor yourself and do not diet yourself. Do not start eliminating things from your diet without medical advice—that way lie illness, infirmity, even the madhouse, and death."

—*Violet Macmillan, B.H.Sc.*

# *Recommended Recipes.*

## Wholemeal Bread.

*Method.*—Mash 1 cooked potato and ½ cup of sugar together. Mix to a paste with fairly warm water and pour into 2½ cups of white flour with one bottle of yeast. (If using compressed yeast, use 2 oz. mixed smooth with warm water.) Leave overnight in a warm place to form the "sponge." Then add 15 level cupfuls of wheatmeal and 2 tablespoonsfuls of salt. Mix to a consistency of a cake mixture with water and "the sponge"—sprinkle 1 cup of wheatmeal over it. Let stand in a warm place. Cut away a portion—toss on to a floured board, turn over once or twice and put in tins. Rise. Bake 1½ hours.

NOTE.—The dough when put into the tins should be as moist as possible—too soft to knead—and it must be handled as lightly as you can. Experience will soon enable the cook to find the exactly correct mixture. This quantity will make four to five loaves.

## Wheatmeal Eggless Cake.

¼ lb. butter.
½ lb. sugar.
½ cup white flour.
1½ teaspoons cinnamon.
3 cups wholemeal.
1½ cups milk.
2 tablespoons cocoa.
1½ tablespoons soda.
½ cup dates.
2 cups nuts.
3 tablespoons golden syrup.

*Method.*—Stir one cup of milk, sugar, butter, and golden syrup in a saucepan until the butter melts. Dissolve the soda in the other half cup of milk. Mix the dry ingredients and add the warm mixture, and nuts and dates. Stir in the soda last. Bake half an hour or longer, and allow to cool before turning out.

## Xmas or Birthday Cake.

Raisins, 1 lb.
Saltanas, 1 lb.
Currants, 1 lb.
Mixed peel, ¼ lb.
Crystallized cherries, 3 oz.
Almonds, ¼ lb.
Butter, 1 lb.
Flour, 4 breakfast cups.
Baking-powder, 2 teaspoons.
Sugar, 2 breakfast cups.
Eggs, 10.
Brandy, 1 wineglassful.

*Method.*—Cream the butter and add the sugar; add the eggs unbeaten one by one. Sift the flour and add the baking-powder to this. Add flour and baking-powder to mixture, then add the fruit, &c., lightly dredged with flour. Last of all, add the brandy. Pour into prepared tin and bake at least five hours. (This makes a light-coloured cake, but a very good tasting fruit cake.)

## Meringue Cake.

Egg whites, 6.
Sugar, 2 cups.
Vinegar, 1 teaspoon.
Salt, few grains.
Vanilla, 1 teaspoon.

*Method.*—Beat egg whites until stiff, add sugar, one teaspoonful at a time, then vinegar, salt, and vanilla, beating constantly (about twenty minutes altogether). Cover the bottom of two round tins with two layers of wet wrapping-paper. Pour in the egg mixture (half in each tin) and bake in a very slow oven (250° F.) for forty-five minutes to one hour. Serve with preserved fruit, whipped cream, or ice-cream between the layers, and whipped cream on top.

## Raisin Puffs.

Cornflakes, 2 cups.
Rolled oats, 1 cup.
Raisins, 1 cup.
Light-brown sugar, 1 cup.
Desiccated coconut, 1 cup.
Flour, ¾ cup.
Melted butter, 4 oz.
Golden syrup, 2 tablespoons.
Boiling water, 2 tablespoons.
Soda, 1 teaspoonful.

*Method.*—Mix cornflakes, rolled oats, raisins, and light-brown sugar together. Melt butter and add golden syrup. Combine and add boiling water in which baking-soda has been dissolved. Drop in spoonsful on a tray and bake in a moderate oven for twenty-five to thirty minutes.

## Date Filling for Sponges.

Stoned dates, 1 cup.
Cocoa, 1 tablespoon.
Butter, 1 tablespoon.
Sugar, ½ cup.
Water, ¼ cup.
Lemon-juice, ¼ cup.

*Method.*—Mix the cocoa with the water. To this add sugar, butter, and dates. Boil until thick and add lemon juice; chopped walnuts, prunes, or pineapple may be added, if desired.

## Wholemeal Shortbread.

¼ lb. butter.
2½ oz. sugar.
1 egg.
½ lb. wholemeal.

*Method.*—Cream butter and sugar, add egg and beat again. Add wholemeal, work well, and roll out on board. Shape and decorate as desired. Bake in hot oven (400° F.) fifteen minutes.

# Founders of Modern Agriculture.

J. W. Woodcock, Fields Division.

## *Theodore de Saussure.*

SO far, in this brief history of modern agriculture, we have concentrated on those who improved the practice rather than the science. Progression was made through intuition and observance of the ways of Nature rather than by research, and the application of the pure sciences to agriculture had only been limited.

It was Theodore de Saussure (1767–1845), the founder of modern plant physiology, who paved the way to a more exact knowledge of the laws of Nature and who made modern agricultural chemistry possible. The quantitative experimental methods which he introduced formed the basis of subsequent work and laid down a definite foundation for plant nutrition.

### Brilliant Researches.

Theodore was the son of Horace de Saussure, one of Switzerland's most celebrated physicists, and the early training he received from his distinguished father, not only in physics but also in botany, enabled him in later years to carry out the brilliant researches which were of such importance to agriculture.

What makes the plant grow? Where does the plant-food come from, and how is it assimilated? These were the questions being asked at the time, and each scientist had a different conception. De Saussure grew plants in air or in known mixtures of air and carbon dioxide; he measured the gas changes and the changes in the plant. He was then able to demonstrate the central facts of plant respiration—the absorption of oxygen and the evolution of carbon dioxide. He concluded that soil furnished only a very small part of the plant-food, but that, small as it was, that part was indispensable under normal conditions.

**A modern experiment in plant physiology on the nitrogen secretion and excretion of legumes.**

### Plant Demonstrations.

He demonstrated that nitrogen was not assimilated by the plant direct from the air, but was supplied through the soil; the latter also provided the ash constituents which were of such importance. Further, he showed that the root was not a mere filter, allowing any and every liquid to enter the plant, but that different solutions were absorbed in varying amounts.

For years the findings of de Saussure were not accepted; nor were his methods followed. Sir Humphrey Davey, who published his book on agricultural chemistry a few years later, would not accept many of de Saussure's conclusions, but these were later verified by such workers as Lawes and Liebig.

To Theodore de Saussure we owe the first definite statement, verified by quantitive experiments and not merely supported by vague theories, of the source and nature of the materials which enter into the composition of plants. Modern agricultural chemistry has been built on this foundation.

## Example of Pasture Improvement.

A striking example of pasture improvement is to be seen on property in North Auckland. A small farm of 30 acres two years ago produced 2,900 lb. of butterfat. With harrowing and top-dressing in two years it now produces 4,000 lb. of butterfat per annum. The soil consists of a heavy clay loam which in parts is podsolized. Two years ago the farmer commenced harrowing the pastures, four strokes each year, accompanied by a dressing of super at 4 cwt. per acre. The original pasture of brown-top, danthonia, and scattered *Lotus hispidus*, with quite an appreciable amount of moss, has given place to a vigorous white-clover and dark-green paspalum. An area of the original pasture has not been treated and receives the same stocking as the remainder. This area, not top-dressed for at least fifteen years, is neglected by stock and stands out to disadvantage to the remaining portion of the farm.

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